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DoD's Technological Edge

Defense AT&L interviews

Zachary Lemnios

Director, Defense Research
and Engineering

ALSO

The Power and Politics of Program Management

The Future of Product Support

Test and Evaluation at the Speed of Need

We Don't Dance Well

Did You Remember to DID?

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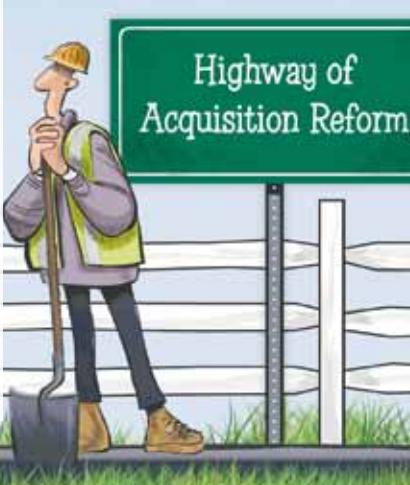
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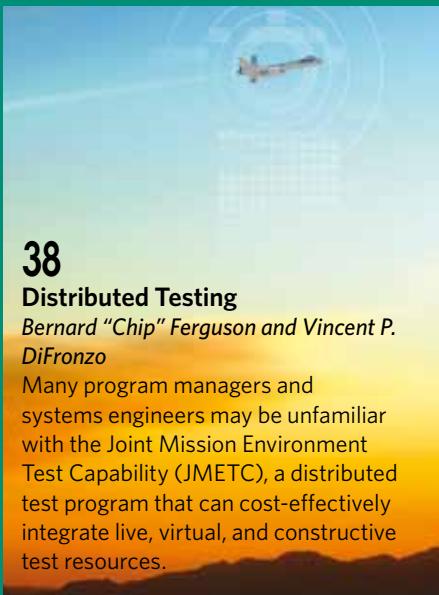
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DoD's Technological Edge

Zachary Lemnios, Director, Defense Research and Engineering

We need to find ways to innovate early concepts in the field as opposed to innovating them and refining them in a research lab and giving [warfighters] a final product.



Zachary Lemnios is the military's top science and technology executive, responsible for about \$12 billion worth of Department of Defense science and technology programs. For years, Lemnios helped spearhead the military's advanced research into turbo-powered microelectronics, labs-on-chips, and learning machines. Now, as the current director for Defense Research and Engineering (DDR&E), he is determined to get the best technology into the hands of the warfighter today while keeping an eye on what technologies will matter in 10 years. *Defense AT&L* spoke with Mr. Lemnios in late December about his vision and trajectory for DDR&E.

Q

Can you begin by talking a little bit about your roles and duties in your job as DDR&E, which also makes you the DoD chief technology officer. Can you give us an idea of what your roles and responsibilities entitle?

A

My title is the director of Defense Research and Engineering, and in that capacity, I report to Dr. Ashton Carter [*the under secretary of defense for acquisition, technology and logistics*]. I have responsibility for the department's full scope of science and technology efforts, to include the work within the Services and within the Service laboratories, the internal science and technology investments that we have within DDR&E.

In a sort of traditional chief of technology role, I have responsibility for a broad scope of activities and work with the Services to shape those in concert with their needs and their activities within their departments. I work closely with the Service organizations and tightly with the Service laboratories. It really is a strong engagement across the whole scope of peers within the department.

Q

You assumed this role in July 2009. Upon your arrival, you introduced four imperatives as the focus for DDR&E. Can you briefly describe the imperatives for us?

A

Let me start by saying a little bit about my background, which might set some context. This is actually my third tour in the department. I was previously, on two occasions, at DARPA [*Defense Advanced Research Projects Agency*], first as a program manager, and then running two of the offices at DARPA: the Microsystems Technology Office and the Information Processing Technology Office. So this is my third time here. It was a bit of a surprise, but when I got the call, I quickly said yes and came aboard. I rejoined the department on July 2, departing MIT Lincoln Laboratory. My background really is at the intersection of technology and systems, trying to build new capabilities that enable new system concepts. And in that capacity, I was absolutely delighted with the opportunity to come on board and shape the larger perspective for the department.

In doing that, I was able to meet with a number of the former DDR&E directors, and I met with many people from across the department and outside the department and elsewhere in government as I was preparing for my confirmation hearing. It was readily apparent that we needed to put a few things in place very rapidly, and that is really what drove the four imperatives.

Let me spend a few minutes talking about those. I call them imperatives because they are not lofty goals or broad mission statements; they really are where we are putting our

resources and our time and effort into day to day. The first of those is probably the most important, and that is to rapidly transition technical capabilities from our research and engineering enterprise to the warfighter. We need to do that in a matter of weeks and months, not years and decades, and move concepts from research and engineering into the warfighters' hands so they can use them. This involves interaction with the combatant commanders, and this involves a tight understanding of what is needed with our users in the field. It involves a keen understanding of what concepts are available that are being developed in the research community. We spend a lot of time working with both the research community and the end users to make that happen.

The second imperative is also important and is really a sort of classic DDR&E mission: to invest in concepts and technologies that will be the core capabilities for the nation five, 10, 15 years from now. It is really investing for an uncertain future. It is investing in people and ideas that will be as groundbreaking a dozen years from now as GPS, stealth, or precision guidance have been over the last decade. Certainly with our efforts at DARPA, which is part of DDR&E, and elsewhere across the department, we are making large investments in advanced technologies such as quantum science, advanced information systems, advanced sending, human and social behavioral models, and a variety of concepts that a decade from now will really be at the forefront of many of the system concepts that the department will be needing. That is really the traditional mission for DDR&E.

The third imperative is one that Congress and the president helped us with by enacting the Weapons System Acquisition Reform Act of 2009. The third imperative is to reduce the acquisition time, the risk, and the cost for major defense systems. Through the Weapons System Acquisition Reform Act, it is absolutely apparent that we need to find more effective ways to build our very complex weapons systems. For us within DDR&E, we've taken that on by standing up the Systems Engineering Directorate and the Developmental Test and Evaluation Directorate. Those two directorates really form the underpinning for the whole set of efforts that work with program offices within the department and the contractors to both understand the risk and embed systems engineering into system concepts that are being developed for the department.

The fourth imperative is one that I felt was foundational. It was something we just had to take on, and that was the science, technology, engineering, and math initiative, which will lay the foundation for future scientists and engineers that will be in the department.

So those are the four initiatives, and they kind of center the work that we are doing in DDR&E and many of our investments.

Q

You've stated that one of your major challenges is to preserve the technological edge of the current force by extending the capabilities of our warfighting systems by incorporating better intelligence, greater speed, longer range, higher precision, and more effectiveness. Can you share with our readers examples of how and where this is being done?

A

We absolutely are concerned about extending our capability set, and I want to talk about that in two areas. The first is taking concepts that currently exist, and the second is investing in new concepts.

With regard to concepts that currently exist, we have a Rapid Fielding Office that is looking at, through our open business cell and through other activities within that office, exploring existing capabilities that are in the commercial sector and exist within the industrial base and that can be applied to issues that come in from our combatant commanders.



We have to have a balance between the deliberative processes that are needed for very large systems and the very agile processes that are needed to support requirements such as when someone's life is in jeopardy.

next month or so. Through those discussions, I've learned not only what comes into the building in terms of urgent operational needs or joint operational urgent needs, but I've also understood what concerns are on the horizon that these combatant commanders really care about. We can and we have resourced solutions for many of the joint urgent operational needs statements through our Rapid Fielding Office.

But we are also looking at what the future will bring and what the future requirements will be. And so we are making investments in our Science and Technology (S&T) Office to really understand what those things will look like. This is driven by studies we have put together, very rapid studies that kind of give us a lay of the land. We launched one very early on the future of computer science. We launched another one in network security. We launched a third study in electronic warfare. That one was interesting because it looked not only at electronic warfare challenges that exist today but where the private sector is going with commercial technology, how that will impact the way we build electronic warfare systems, and how our adversaries are going to build them. We've really taken this red/blue, measure/counter-measure assessment to try to understand, as we build concepts, how will our adversary counter them and how will we counter our adversaries' concept. Most of the projects that we take on are sort of like pick-up games—we find the right resources and the right people within DDR&E. We bring people in from other agencies and other parts of the department, and we focus on a technical problem. In the case of electronic warfare, we engaged folks from the Naval Research Laboratory, from DARPA, and from elsewhere within DDR&E to try to look at that challenge and bring ideas to the table, and then we use the results of that study to impact our program guidance.

Q

You touched on how you draw on different minds to come up with new concepts. How do you encourage creativity and innovation within the DoD system?

A

I think that is an absolutely central issue here. In fact, the coordinates that I think most about are the coordinates of innovation, speed, and agility. That is the coordinate system of any strong business. It is the coordinate system of any first-rate entrepreneurial organi-

zation. But they are not the traditional coordinates of the department, and it is something we are trying to move toward. One way to move in that direction is to engage universities, to engage small businesses, and to engage research organizations within large businesses; and we do a lot of that. I spend a lot of time meeting with each of those organizations. I encourage them to come in and tell us how they have new ideas and how they can bring on new concepts very rapidly.

But again, all of this drives toward the need to rapidly deploy new concepts within weeks and months. That is something that we have to do at a very high pace for quite some time.

Q

Can you discuss the organization of DDR&E?

A

DDR&E had a large number of offices, all of which were doing good things with good, dedicated people, but I wanted to really cement an organization that reflected the imperatives we had put in place. In doing that, we stood up the Research Directorate, which is largely centered on the S&T objective. We stood up the Rapid Fielding Office, which is all about getting concepts quickly to the field. We stood up the Systems Engineering Directorate and the Developmental Test and Evaluation Directorate, and those two are really structured around our major weapons system programs.

In all cases, we brought in some very, very good people, and we've coupled very tightly with organizations outside of DDR&E across the department with the Service laboratories to make this happen.

Q

Was this restructuring also designed to create an organization that would reduce the cost, acquisition time, and risk of major defense systems?

A

Absolutely, and let me give you an example of that. Our Systems Engineering Directorate has two functions. The first is to help the program offices understand what the risks are in major weapons systems, what the technology readiness assessments are, how mature are the technologies that are going into these systems, how mature is the manufacturing capability of the contractors that are building the system for the department, and what the test results are from early article evaluations from those systems.

But the other side of the Systems Engineering Directorate is something that we stood up and I wanted to really drive hard: an organization that looks at systems architecture very early in the program, well before we have a program of record. They really look at the system trades, the architectural trades, in system concepts. Much of the cost of a major weapons system is determined well before Milestone A, well before we even launch the program in a major way,

when we set the architecture. It is sort of like building a house: you can get an architect to design a house for you, and you can always pay for changes later, but if you get the architecture right first, you will save much of the cost later on the cost of your home. We do the same in building a major weapons system. Much of that cost is determined by the early architectural understanding.

Having an activity here that really understands that trade space—how we bring systems together, what is the performance cost trade space of an architecture relative to another architecture—that is a discipline that the department had 20 years ago and it has since atrophied for a lot of reasons. We are trying to rebuild that. That activity resides in our Systems Engineering Directorate. And I think that activity is going to have significant benefit to future systems concepts in the department.

Q

You also mentioned that there was a Developmental Test and Evaluation Directorate that was created. Can you talk a little more about the roles and responsibilities of this directorate?

A

The Developmental Test and Evaluation Directorate is evaluating early system test results well ahead of Operational Test and Evaluation Directorate. As systems are being developed and the first articles go through testing, this directorate validates those results and works with the program office to make sure the test plans support the needs of the system and are independently verified. It provides an assessment of the risk for that program to move to the next step. It is really part of our much broader set of activities that we have with all the major systems programs to really understand how they are proceeding along their major system program development.

I think you see a strong engagement between the developmental test and evaluation and the operational test and evaluation. The difference is operational test and evaluation is done with the final test article; developmental test and evaluation is done with an early article before it has finished its full development. What that does is help us assess risk in the program while the program is still under development. By getting early feedback of these test results, we can reduce a lot of risk in the system program process. It is a quality control function, but it is also providing feedback to the design group, and that is a critical feature. It is not an audit group. In fact, what I've encouraged all of our folks at DDR&E to think hard about and work hard at is we are not an audit function; we are thought leaders in each of these functions. The role of developmental test and evaluation is to understand the test results from early articles that are built and early system concepts that are demonstrated, and feed those results back to the developer so they can harden the design. It is that feedback loop that will help us quickly converge on system concepts that provide the performance that is really needed.

Q

Right now, DoD is shifting its focus from operations in Iraq to Afghanistan. How is DDR&E responding to those shifting requirements?

A

That is an important shift, and it is one that is challenging our ability to field systems on a very rapid basis. It is challenging our ability to bring new technologies to the warfighter, and challenging our ability to really do this at pace. In anticipation of this, we stood up several task forces that are actively working to bring concepts to the field in the areas of base protection, helicopter survivability, and counter-IED. Those three are really at the forefront of what we are working on right now. We have other task forces working in other areas, but those three are really our focus, so let me spend a minute talking about those.

We stood up the Helicopter Survivability Task Force in the summer of 2009. It ran for about a month and came out with a number of early concepts that we could quickly bring to the fight and deploy by spring of 2010. We've been working with Army Aviation and folks across the building to find concepts that would protect our H-60 Blackhawk helicopters and our CH-47 Chinooks, the predominant helicopters in Afghanistan. As part of that recommendation, we also came up with a concept to use the autonomous helicopter A160 Airship for a resupply mission. In doing so, we would take airmen out of harm's way in a resupply mission. That is an autonomous helicopter, of which the department currently owns about 10 or 11, and we would use two of those in

Afghanistan for this resupply mission. The Helicopter Survivability Task Force looked at what concepts we can bring to the fight in March/April 2010 that would significantly reduce the risk of our helicopter operations in Afghanistan. We identified the first round of concepts, then a second round that will be ready in September 2010, and a third round that will be ready in March 2011. Each of these requires increasing levels of development with some risk associated with the out-year activities.

The Base Protection Task Force is doing the same thing for how we protect our base operations on forward deployed bases. We've looked at everything from what we can do to

reduce fuel usage and improve water supply activities at the forward bases, and what we can do to improve surveillance concepts and reduce the risk of an intrusion from unknown threats on these forward operating bases. We are just now working through those concepts, and we will be making some recommendations to the department in the next month or so as to what we can do there.

We are also working with the Counter-IED Senior Integration Group, in terms of technical concepts, to counter the IED threats that are occurring in Afghanistan. Those are very different than the IED threats that we've seen in Iraq; they are largely homemade explosives, the networks are far more complex, and they are far more disruptive. We are looking at what the future threat would look like, and how might we disrupt a number of networks as opposed to just a few networks, and those concepts are being considered by a group that we are supporting within DDR&E.

When I became director, I made it a priority to meet with all the combatant commanders, and they have all told me the same thing: We need the 80 percent solution today rather than the 100 percent solution five years from now.

Q

How are you balancing DoD rules and regulations about this issue and getting these products out quickly?

A

We've always had a lane in the requirements process to support our joint urgent operational needs. We have needs statements that come in from the combatant commanders routinely for urgent operational needs where there is a need for a concept to protect life, where there is an imminent threat to life. Those needs are balanced across the department. They are resourced through Congress's reprogramming actions or within the department. We look at what concepts are available and work with the comptroller within the department to resource those, as well as with Congress, to start new activities when those make sense.

We have to have a balance between the deliberative processes that are needed for very large systems and the very agile processes that are needed to support requirements such as when someone's life is in jeopardy; we just can't rely on a five-year process to support the real-time, near-term needs of the department.

I mentioned that when I became director, I made it a priority to meet with all the combatant commanders, and to a person, they have all told me the same thing: We need the 80

percent solution today rather than the 100 percent solution five years from now. We need to find ways to innovate early concepts in the field as opposed to innovating them and refining them in a research lab and giving them a final product, and they want to find ways to better engage the user in the definition of the concepts. In all cases, we are trying to find ways to do that. The DoD 5000 process really was put in place for the development and deployment of major weapon acquisitions. In that light, it makes a lot of sense; there are checks and balances. You would never build an aircraft carrier without a deliberative process. You would never build a joint strike fighter without a very deliberative process to control costs and schedule and performance. But there are other things that need

to be done in a much more rapid way, and through our Rapid Fielding Office, we are trying to do that.

We have a joint rapid acquisition cell. This group of very dedicated people works with the combatant commanders to identify the joint urgent operational needs, and they find ways to resource those needs very rapidly through existing contracting channels that we have through our contracting base. In some cases it may be a reprogramming action; in most cases, we will go to the Services to resource those.

You've got to have both these processes in place. You have to have a very rapid way to move concepts and you've got to have a very deliberative process for very large programs.

Q

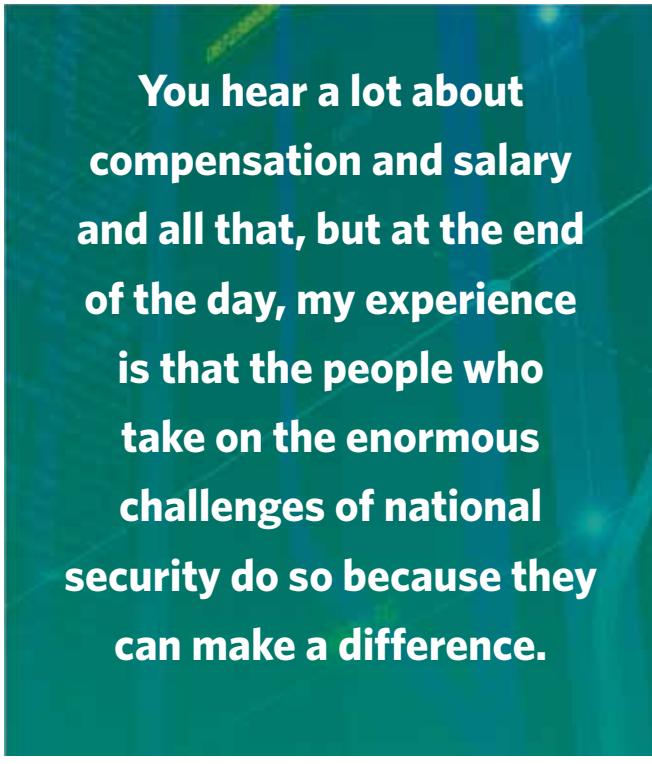
In the last few years, DoD has focused on quickly procuring technologies to get them to the warfighter faster. As director, how do you foster communication between the technology communities, acquisition personnel, and end users to speed technology transition?

A

That is a big challenge. We come back to that issue over and over again when speeding concepts to the field—understanding what is possible. I guess the first two parts of that challenge are understanding what the user really needs and understanding what is possible from the technology side. In many, many cases, what the user needs is more than just a single technical widget; it is a combination of some new technical concept, some new operational concept, and maybe something that integrates the two. I think we spend as much time on the user side of the equation as we do on the technical developer's side of the equation. And that is really an area that sets us apart. Organizations like DARPA spend a lot of time on the developmental side of the equation. They also have a tight connection with the user, but their real focus is in developing new technical concepts. I look at the Service research laboratories, and they are deeply steeped in technology development for core service missions. Our job is to try to integrate those with what the user really needs in terms of the system concept.



Innovation, speed, and agility are the coordinates we are trying to work through, and if we make those changes over the next several years, it will really have a positive impact for the department.



You hear a lot about compensation and salary and all that, but at the end of the day, my experience is that the people who take on the enormous challenges of national security do so because they can make a difference.

(an architectural evaluation), and we are trying to build that into our program plans as well. I think we will be doing more architectural trading where we examine the various alternatives and options to create an optimal solution for these systems. Our goal is to understand the architectural trades basis for what a combatant commander really needs in the field, along with their assessments to try to build a technical element.

I'll give you an example of how we are trying to drive the transition of technologies through the Joint Capability Technology Demonstration [JCTD] program. This program started probably 15 years ago as the Advanced Concept Technology Demonstration program, and at the time, it was a program really to field early concepts in about 18 months. It took off and developed all sorts of early demonstrators—the UAV [*unmanned aerial vehicle*] was one of its early programs.

But over time, that program morphed into larger and larger system concepts and longer and longer duration timelines. Most recently, it has taken on some very important projects but the timelines have moved very much to the right, so they are now four- or five-year programs. They don't have the level of innovation that I was really hoping they would have. So we took a really close look at this and we reshaped the JCTD program so that the first year will be an early demonstration. We are asking that we get the requirements in from the combatant commanders, and that they give us their rack and stack of what they want to pursue. Then we work with their folks to define the first-year demonstration and really

work that first year to demonstrate the early concept. We'll use that demonstration to evaluate whether we move forward with the program.

Getting people focused on what that one-year demonstration will actually look like drives the innovation, drives the competitiveness of that program, and I think it is going to pay big dividends. We've gotten broad support across the spectrum on this.

Q *Looking at all of DoD's threats right now—cyber attacks, terrorist attacks—it is uncertain who the enemy of the future will be and how that enemy will engage. Identifying breakthrough capabilities can garner DoD significant advantages over potential adversaries. What does DDR&E do to identify the new or emerging technology that will provide an edge over unknown enemies?*

A We've put in place a strategic cell to do some of those assessments, and this includes strategic net assessments against concepts and technologies that we see both overseas and globally. Those assessments are also helping us better focus our internal resources. I really want to make sure the S&T investments that we have within the department are all focused on the most pressing challenges the department faces, and that our investments are overwhelmingly competitive relative to what we see in the private sector, and certainly with our adversaries. Building assessments that evaluate the research that we are investing in relative to best-in-class in the private sector and best-in-class to what we've seen offshore is critically important, and we are doing that.

I think as far as the technical areas, the threats that we are seeing clearly have a much larger information content. The ability to disrupt our information networks is absolutely critical. We are working to protect them in a significant way.

We have significant investments and programs looking at how we build very complex systems. The complexity of our systems is a systems engineering challenge, and having the tools and the ability to integrate a large number of systems in a network sense is critically important. Most of what we are building now are network-enabled concepts, so understanding how you build reliability into that and how you build assurance of performance into a very complex system is a challenge that we are addressing.

Q *A recent study observed that "civilian career paths in the DoD research labs and program management are not competitive to other opportunities in attracting outstanding young scientists and retaining the best people." What plans*

does DDR&E have to attract needed employees from the STEM career fields: science, technology, engineering, and mathematics?

A

We spend a lot of time talking with students, with people in those areas across the base. We have tight connections with industry and academia. I think a lot of it is done by example. I think if you give people a challenging problem, give them the resources to work through that challenging problem, and give them the right environment where they can grow technically and contribute, then people will move in that direction. You hear a lot about compensation and salary and all that, and that's great, but at the end of the day, my experience is that the people who take on the enormous challenges of national security do so because they can make a difference. They understand the importance of the programs they work on. I came from MIT Lincoln Laboratory, and certainly, we saw that people were there because they wanted to contribute to a national defense initiative. They had the resources, the environment, and the lab structure to really make it happen. While compensation was good, the most important thing was making a difference. And when I visit academia, when I visit industry, I see the same group in support.

We are working closely with the DoD laboratories to really make sure the infrastructure is correct. We are making sure we present a set of challenging problems for them to work on, and certainly we are doing that, but I am also trying to bring in some very good people within the department. Whether we bring people on board as DoD employees, or whether we engage our FFRDCs [*Federally Funded Research and Development Centers*], our UARCs [*University Affiliated Research Centers*], and other activities outside of the DoD to work on DoD problems, we'll work all of those channels. At the end of the day, the department has a very clear set of national security challenges before us, and we need very bright people to help us work through those, on the technical side and on the operational side. It is really that intersection that becomes very important.

Q

What is DDR&E's role in support of the recently published Quadrennial Defense Review (QDR) 2010?

A

We've been very much part of the QDR. We've attended and, in fact, led many of the technology initiatives that led up to that, and we are certainly aligning our science and technology reviews to align with the QDR. We've led seven of the program objectives memorandum program budget assessments, including energy security, cyber security, medical research, space research, space architecture, and a number of other areas. We've led a number of

the technology assessments—biometrics is one we had a key role in, having led much of that effort in Iraq and now standing up a biometrics effort in Afghanistan. For us, that was critical. And we are providing technology integration in support of the QDR initiatives. I think that is an important document; it will be the unifying element across the department for our defense posture.

Part of our role within DDR&E is not only to develop technology concepts but to look at how those concepts fit into a broader architecture. How do systems interoperate, how do the core technologies enable system concepts? Going from technology investments to system capabilities to operational capabilities, that thread is critically important, and we provided assistance to the QDR in working that thread—certainly in biometrics and other areas as well.

You can look at top-down requirements and look at the top-down missions assessments; these are the missions the department wants to pursue, these are the core capabilities that it needs to pursue the missions, these are the enabling technologies that are needed to support the capabilities. We do a lot of the top-down assessment. Much of what we do within DDR&E not only supports a top-down assessment but really thinks hard about where that technology could make a difference in the overall scheme of things. DARPA does that pretty well. They are not a requirements-driven organization at all; they were never designed to be that, and they shouldn't be. They really start with a core technology and think about what capabilities that technology could provide the warfighter. We integrate those aspects and provide that integration function within DDR&E.

Q

Is there anything else you would like to add?

A

I think the key message goes back to the four imperatives we put in place. I want to find ways to rapidly accelerate technology. We've got to make investments in people and ideas that will change the shape of our tool set and our capabilities a dozen years from now. The cost of weapons systems is enormous, and we are trying to make some big changes in our understanding of those systems. We've got to bring more really bright people into the department and make sure we have a future corps of scientists and engineers for the department.

In all cases, innovation, speed, and agility are the coordinates we are trying to work through, and if we make those changes over the next several years, it will really have a positive impact for the department.

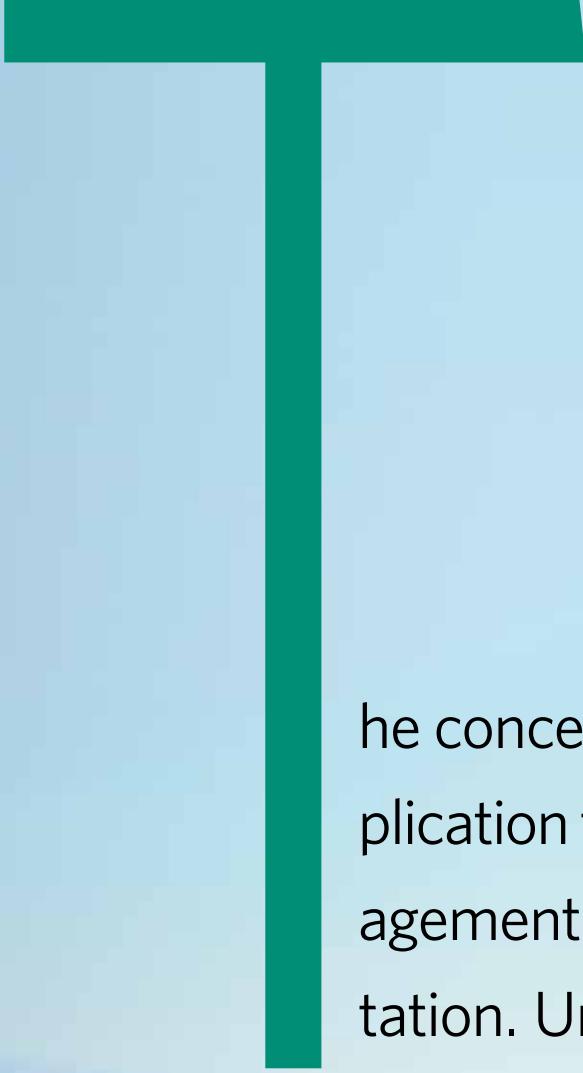
Q

Thank you very much for your time, Mr. Lemnios.



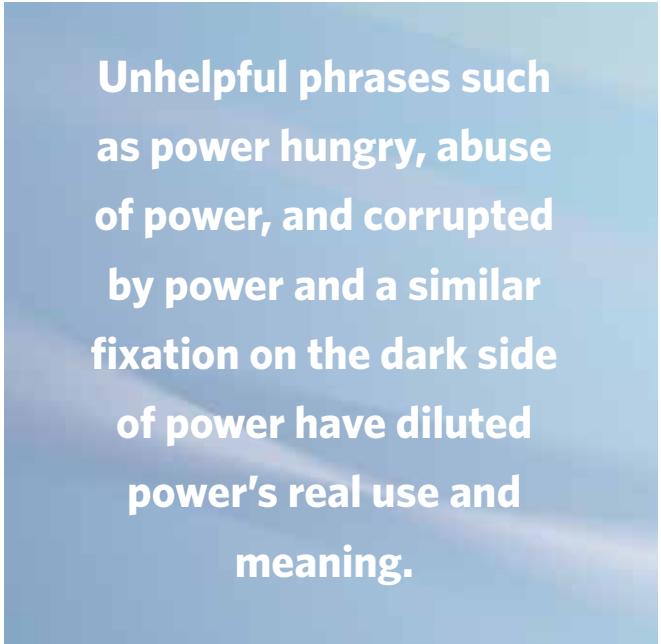
The Power and Politics of Program Management

Roy L. Wood



he concept of power and its application to leadership and management has gotten a bad reputation. Unhelpful terms such as power hungry, abuse of power, and corrupted by power and a similar fixation on the dark side of power have diluted power's

Wood is the dean of the Defense Systems Management School-School of Program Managers.



Unhelpful phrases such as power hungry, abuse of power, and corrupted by power and a similar fixation on the dark side of power have diluted power's real use and meaning.

real use and meaning and deprived some leaders of the opportunity to understand and use various forms of power to good purposes. This article examines what power really is, how it is acquired and expended, and why it is absolutely essential to the leader. Examples from program management will be used to illustrate throughout.

Power: The Motive Force of Leadership

In his seminal book on leadership, aptly (if not imaginatively) entitled *Leadership*, Peter Northouse defines leadership as the “process whereby an individual influences a group of individuals to achieve a common goal.” Influence, in this definition, is the mechanism by which leaders get things done. But how does a leader gain the ability to influence others? What, in other words, is the engine that drives influence? The answer, of course, is power.

Much as a motor requires electricity and an engine requires fuel to get work done, the leader must also have a source of power to make things happen. Like electricity and fuel, a leader’s power is simply an enabler. In and of itself, power is neither good nor evil. Only the way power is used by the leader gives it moral and ethical dimensions.

Power Sources

Positional Power

The most obvious power source is based on one’s position within an organization and the authority given that position. In a program office, for example, the program manager has a primary source of power based on his or her position and authority as the leader of the program team. In that capacity, the PM has authority to make decisions with regard to the program and the team, has the ability to garner and expend resources, and has access to important external stakeholders and decision makers.

The PM’s organizational power may also be enhanced by the ability of the program manager to reward or punish individuals on the team through annual evaluations, bonuses, or specific task assignments. These instruments of power can provide a PM considerable ability to influence team members to work toward the goals of the program. Legitimate positional power is not dependent upon the charisma or skills of the particular individual in the position, nor is it generally dependent upon whether individual team members are personally invested in doing their tasks.

Personal Power

The second type of power is that generated by the individual leader. One source of personal power may be what some authors call “referential power.” Such power is based on the charisma, likeability, respect, or positive feelings the leader generates among subordinates. Many program leaders are likeable folk. They are respectful, trustworthy, and fair in their dealings with others. They set a good example; and others want to follow them, learn from them, and be a part of the leader’s team.

Other types of personal power are reputational and expert power. In a complex project, the PM should know more than anyone about his or her project, and thus wield considerable expert power. His decisions carry considerable weight because of the expertise the PM brings to the table. It’s the proverbial “smartest fellow in the room” approach that creates significant influence over program decisions.

Over time, expert power grows into reputational power, which can expand the scope of the individual’s power base. The late Rear Adm. Wayne Meyer led the Aegis combat system and shipbuilding program for 13 years. He used expert power to help make that program a success, and his reputational power as a successful leader and technical manager persisted through the remainder of his life. He was a highly valued consultant and “graybeard” across a broad array of defense acquisition topics.

Coalition Power

The third power source is one that is gained through coalitions and interdependencies with others inside and outside the organization. Coalition power is situational, negotiated, and often temporary. It is highly dependent upon the strength of relationship and alignment of goals with key stakeholders. For example, a PM who has built a trusting relationship with her resource sponsor and shown how her efforts will result in delivering a needed capability may have built a strong power base to stave off future budget cuts.

The importance of actively building power through stakeholder coalitions cannot be overemphasized. The program leader must make a concerted effort to get to know key stakeholders, their goals and issues with the program, and

how the program manager can better align himself to them for success. The PM must realize, however, that coalitions exist around specific issues and goals—not around entire programs. While all stakeholders may be generally invested in a program's success in delivering needed battlefield equipment to the troops, each stakeholder will have particular strong interests in certain program aspects. For example, a member of Congress may be interested in how many manufacturing jobs a program will bring to his or her district. A comptroller would care about a program's actual versus planned obligation and expenditure rates. A member of the press corps might be focused on how the project will directly benefit a soldier in Afghanistan. Each of those stakeholders has different goals and agendas. The PM may or may not be able to create a relationship and show how the program goals align with the stakeholder's. If so, a coalition might be formed; if not, the relationship may not generate power.

Expenditure of Power

Power has no effect until it is expended. A wise leader chooses how and when to apply just the right amount of power to influence an individual, group, or situation to move the agenda forward. If there is application of too little power, there may be no movement; application of too much, and the situation may spin out of control. How, then, does a skillful leader expend power appropriately to achieve her goals?

Application of power to achieve goals usually manifests itself in one of two ways. First, power can be used to influence decisions. Consider the question: Should the program proceed on course, or should a new technology be adopted? It may be within the PM's purview, using his positional power, to simply decide on the course of action and press the team to proceed. It may be that the new technology has strong supporters in industry and Congress. If the PM's goals were in alignment with external stakeholders, then those supporters might form an even more powerful coalition in support of the PM's decision to proceed with integration of the new technology. If the PM is opposed to changing course because it disrupts the program schedule and increases cost, he may choose to use his expert personal power to convince industry and Congress that the change would be too disruptive. The PM may also enlist the end user, resource sponsor, or comptroller—who all may have interests in staying the course—as a coalition to counterbalance industry-Congress power.

The second way power can be used is to influence others to take on tasks that help achieve goals. In the previous example, the PM may acknowledge an alignment of goals to incorporate the new technology, but argue that because of additional costs and potential schedule impacts, Congress and industry must help the PM mitigate the risks. Additional funding and favorable contract terms might be more easily negotiated by the PM from this position of power.

As noted earlier, an astute PM can use both his positional and personal power to influence the actions of the program team. Leading by example, offering rewards, or threatening punishments all can be used as power tools to accomplish goals. However, in a more subtle and counterintuitive way, the PM can often gain more power by sharing it among the team. Building an expert team, for example, and delegating authority to them to speak for the PM at their meetings can be a force-multiplier. The PM's power can thus be applied on her behalf on occasions where she cannot be present. Further, gaining team consensus before major decisions are made can also increase organizational power by aligning internal stakeholders and gaining team buy-in. Individual members who were part of the process to make a major decision are more likely to support it and work harder toward its accomplishment than they would for a decision thrust upon them.

Politics

If all this smacks of politics, there is a clear connection. Except for the most elementary leadership and management tasks, there can be, and usually is, a political component to nearly every use of power. When the stakes are high and stakeholders are many, varied, and powerful, the leader must become politically savvy to avoid common traps and achieve desired goals. Again, though politics, like power, has gotten a bad name, it is a necessary skill set for a successful program manager.

Indeed, when one wields any sort of power, there exists an inherently political component. How often, for example, when simply conducting routine annual employee evaluations, have leaders or subordinates been wryly accused of engaging in politics? Further, the act of building coalitions itself is clearly political. Rather than considering politics as something to be avoided, it should be accepted as a natural component of leading. As such, it should be embraced as a valuable skill in the savvy leader's toolbox to learn and improve. As a program manager, there are an infinite number of potential political pitfalls to be aware of and actively managed. Only a few tactics will be discussed here.

Direct Opposition

This is perhaps the most straightforward approach by an opponent who feels he has sufficient power to kill or cripple your effort. Opposition could come from an individual, but more likely, it is being mounted by a coalition that shares real or perceived concerns about the program. Direct opposition will normally occur early in the program's life, before it has built its own supporting power network, or later, when serious technical, cost, or schedule problems become obvious and stakeholders begin to abandon their prior support. A savvy PM would have seen either of those situations coming and worked to fix the underlying problems and build or rebuild support. Since the reasons for direct opposition are generally clear and in the open, the PM can attempt to directly address them. In severe cases, the

GREAT MOMENTS IN ACQUISITION HISTORY



to work known ricebowl issues can be an effective neutralizing tactic.

Rival Camps

Acquisition is often seen as a zero-sum game. If one program gains resources, another has to lose. The situation sets up rival camps, each vying for resources at the expense of others. That may be particularly true in programs that are creating similar capabilities, perhaps in different military services. It can also happen when a new program begins to siphon off resources from an older, established program that it may ultimately be replacing. The savvy PM needs to be aware when such situations arise and enlist the assistance of his leadership and stakeholder network to help minimize friction or simply choose between competing programs. Direct



10,000 BC: C.A.I.V. men invent Cost As an Independent Variable

PM may need to recognize a losing battle and work to gracefully end a program.

Insurgency

Unlike direct opposition, an insurgency's underlying purpose and agenda may not be well understood. Indeed, there may be clandestine members of the opposing coalition who remain unknown for some time. The PM and her allies must work hard to uncover and address the real issues. Some insurgent coalitions can be weakened or broken by working out individual issues to the satisfaction of some key stakeholders.

Ricebowls

Single-issue stakeholders often demand attention to satisfy their concern in return for their support (or at least withdrawal of their opposition). This is particularly prevalent in oversight organizations where many feel empowered to slow or stop progress of a program until their specific needs are met. PMs who are aware of those ricebowls can attempt to address individual concerns as they arise. Unfortunately, in large oversight organizations, that can seem like a game of whack-a-mole and be an enormous time drain on a program. Assigning and empowering trusted program team members with expert power

discussions between PMs in competing programs may also reveal some means to establish a negotiated truce. If battles are allowed to continue between rival camps, both programs may ultimately lose.

The Importance of Recognizing Power and Politics

Power and politics are inherent components of complex defense projects. Programs with large budgets, long life cycles, and powerful stakeholders are fertile fields for political intrigue and power plays. While many PMs view the use of power and politics in programs as distasteful, they are nevertheless part and parcel of the acquisition process. PMs who recognize that and learn to wield power responsibly and address political issues when they arise can be more successful in achieving their program goals.

The author welcomes comments and questions and can be contacted at roy.wood@dau.mil.



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The Future of Product Support

Randy Fowler

The military, political, and economic stars are aligned for fundamental reform of product support as part of acquisition reform, providing a window of opportunity in which fundamental reforms are not only possible but required. In that context, in 2008, the Office of the Secretary of Defense for Logistics and Materiel Readiness established a group of senior government and industry personnel—the Product Support Assessment Team (PSAT)—to assess and offer an action plan for improving product life cycle support.

In November 2009, Under Secretary of Defense for Acquisition, Technology and Logistics Ashton Carter endorsed the report issued by the PSAT. In the foreword of the report, the USD(AT&L) asserts, “If the department is going to truly reform the business of delivering weapons system capabilities to the warfighter, it must also reform the stewardship of the \$132 billion dollars spent each year in product support. Reformed stewardship—

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driven by improving product support and achieving more cost-effective weapons system readiness outcomes—requires a life cycle management focus, committed leadership, and cooperative efforts from the operational, acquisition, and logistics communities.”

The report makes eight distinct but inter-related recommendations:

- Adopt a product support business model that drives cost-effective performance and capability for the warfighter across the weapons system life cycle and enables the most advantageous use of an integrated defense industrial base.
- Align and expand the collaboration between government and industry that produces best-value partnering practices, both within and beyond the depots.
- Connect platform product support strategies to enterprise supply chain approaches that produce best value across the DoD components.
- Improve weapons system governance so sustainment factors are better considered early and consistently across a weapons system life cycle.
- Develop an overarching DoD sustainment metrics and management strategy for life cycle product support that strengthens formal data collection and analysis capabilities while providing insight and learning to support life cycle planning and operational management.
- Make life cycle affordability a core business process for all communities and stakeholders involved in system acquisition and sustainment.
- Clarify and codify policies and procedures pertaining to the use of analytical tools in the life cycle product support decision-making process.
- Integrate product support competencies across the logistics and acquisition workforce domains to institutionalize successful traits of an outcome-based culture.

As DoD moves forward with acquisition reform and improved life cycle management practices, product support improvement is a key enabler of those critical efforts. The report’s recommendations will yield a higher level of effectiveness in overall acquisition and logistics processes and, in turn, will significantly improve the sustained capability and affordability of our weapons systems.

And while the continuing vigorous efforts in acquisition reform are to be applauded and supported, the recommendations of the product support assessment fill the gap generally missed in the current acquisition reform initiatives. Acquisition reform is not enough; reform needs to be an umbrella extending over the complete set of processes that deliver and sustain warfighter capability. The PSAT action plan, endorsed by the USD(AT&L), is a powerful complement to ongoing ac-

quisition reform initiatives, fostering a life cycle management perspective for the future.

Opportunity Spanning Acquisition and Logistics

Weapons system product support operates at the intersection of defense acquisition and logistics. Product support, also referred to as system sustainment, is the package of support functions required to maintain the readiness and operational capability of weapons systems, subsystems, software, and support systems. It encompasses materiel management, distribution, technical data management, maintenance, training, cataloging, configuration management, engineering support, repair parts management, failure reporting and analysis, and reliability growth. Product support considerations, germane to both acquisition and logistics, are necessary throughout the DoD life cycle framework, beginning with early requirements determination and continuing through system design, development, operational use, retirement, and disposal.

Spurred by perceived and documented shortcomings in the cost-effective procurement and affordable operation of DoD systems, acquisition and logistics processes have been the recurring focus of defense studies, reform efforts, and transformation initiatives. Despite more than 130 studies and commissions on defense acquisition since World War II, acquisition core problems persist according to the secretary and deputy secretary of defense. Despite more than 90 logistics reform, re-engineering, modernization, and similar strategic studies and plans in the past 20 years, no broad consensus has emerged on DoD logistics transformation. Both areas have been on the Government Accountability Office High-Risk List for the past 19 years—the only defense business areas with this unenviable track record.

Since the publication of the 1999 report, *Product Support for the 21st Century*, the DoD strategy for product support has been evolving from traditional transactional logistics concepts—in which the components of readiness are acquired as discrete unit transactions—to a stronger emphasis on acquiring the operational readiness outcomes themselves. The poster child of this latter approach (and by policy, DoD's preferred sustainment concept) is called performance-based logistics, or PBL. Developed in response to the death spiral

of decreasing readiness and increasing costs in the 1990s, PBL strategies were an attempt to reverse this trend. Today, about 20 percent of DoD weapons systems use a PBL strategy, in whole or part. The strategy shows continuing signs of institutionalization in the military services

The review conducted by the PSAT was not restricted to PBL. It undertook a broad review of product support strategies. Few argue with an outcome-based performance approach's ability to improve system performance. Recent empirical research from The Wharton School unambiguously demonstrates the impact of 10 to 25 percent in reliability improvements under performance-based approaches, but questions remain on its cost effectiveness. However, because of the lack of definitive proof of an outcome-based strategy's ability to reduce costs, in the current budget environment, critics are quick to urge abandonment or movement away from the approach.

PBL is a label that was applied a decade ago, and while the label has remained unchanged, product support sophistication has grown and approaches to outcome-based strategies have evolved.

While there are critics, there remains a strong consensus that an outcome-based, performance-oriented product support strategy is a worthy objective. Unfortunately, those labels are inextricably linked to the legacy of PBL. In that context, what to do about PBL or where to go after PBL has become the major product support strategy debate. That issue, and that view, is too narrow. PBL is a label that was applied a decade ago, and while the label has remained unchanged, product support sophistication has grown and approaches to outcome-based strategies have evolved.

Today, there is a rich target set that can yield to an outcome-based, performance-oriented approach. While military operations have become increasingly joint, sustainment processes remain overwhelmingly Service-centric. Product support, despite significant policy and guidance on increased governance and the need to transition to performance-based strategies, reflects only marginal progress on both fronts. Determination of best-value support strategies is based on a business case analysis process that has been consistently criticized by internal and external reports, citing reliance on immature data; inconsistent application; and overreliance on a one-size-fits-all analytic approach that fails to acknowledge differences in criteria such as

Table 1: Summary of Study Findings

| | |
|---|---|
| Maturity Assessments of Product Support Processes | <ul style="list-style-type: none"> Maturity assessments reflected consistent weaknesses in virtually all key product support processes None of the areas studied achieved a maturity rating above average The most mature process areas were customer-facing metrics and performance outcomes The weakest areas were business case analysis process and cross-service alignment |
| Root Cause Analysis of Major Product Support Issue Areas | <ul style="list-style-type: none"> Continued reliance on transactional-based systems and processes Inadequate human capital Need for smart managers and smart buyers Organizational challenges Lack of shared goals |
| Weapons System Data Analysis | <ul style="list-style-type: none"> Performance-based (outcome-based) product support strategies, particularly when coupled with government-industry partnering approaches, have consistently delivered improved materiel readiness across numerous weapons system applications over the past decade Cost benefits are more difficult to assess; as cited in several GAO reports, many outcome-based support strategies have claimed cost reductions and cost avoidance, but DoD financial systems lack the visibility and fidelity to validate these benefits consistent with audit standards |

life cycle phase, level of planned product support, and availability of credible data. The logistics information technology infrastructure has been slow to modernize and is challenged to optimize the integration of vertical weapons system supply chains with traditional horizontal commodity-based supply chain processes. Acquisition and logistics workforce assessments have reported weaknesses in both communities, citing shortcomings in competencies and culture needed to translate warfighter performance requirements into cost-effective product support spanning the weapons system life cycle. The PSAT recommendations identify ways to strengthen those weaknesses.

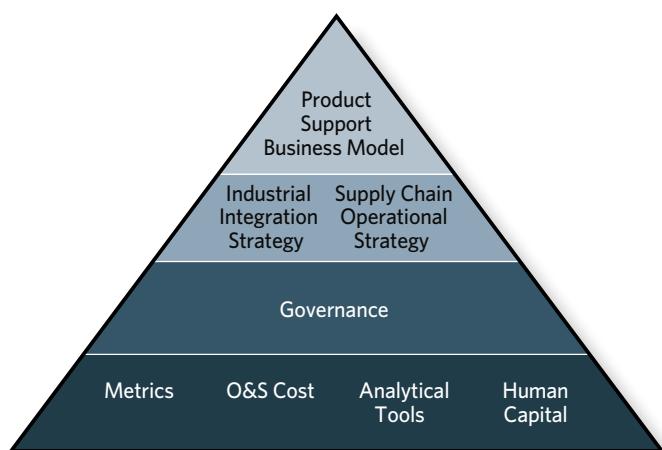
transactionally based systems and processes, inadequate human capital, need for smart managers and smart buyers, organizational challenges, and a lack of shared goals.

While there are a range of indicators resulting from the maturity assessments and root cause analysis, the weapons system data analysis clearly shows that performance-based (outcome-based) product support strategies, particularly when coupled with government-industry partnering approaches, have consistently delivered improved materiel readiness across numerous weapons system applications over the past decade.

Cost benefits are more difficult to assess, as documented in several GAO reports. Many outcome-based support strategies have claimed cost reductions and cost avoidance, but DoD financial systems lack the visibility and fidelity to validate those benefits consistent with audit standards. In summary, performance-based product support strategies consistently deliver improved materiel readiness, but assessing the true cost of both traditional (transactional) and performance-based strategies is difficult, if not impossible, given current financial systems.

The eight principal recommendations that resulted from the collection and analysis of the study data (and are mentioned earlier in this article) can be categorized into three groups. Figure 1 summarizes the recommendation areas, reflecting the symbiotic relationship among the recommendation categories. Within the pyramid model, the top two bands are recommendations that reflect strategic priority initiatives, the third band reflects the critical governance processes necessary to provide product support accountability across the life cycle, and the pyramid base reflects the foundational elements that are necessary to exploit the higher-level reforms. Three integrated process

Figure 1: PSAT Recommendation Areas



Findings, Recommendations, and Implementation Approach

The PSAT conducted root-cause analysis on major product support issue areas and found consistent themes throughout, as detailed in the table. Specifically, product support suffers largely from continued reliance on

teams will be formed to pursue the specific recommendations in each of three areas.

Management oversight for the three teams will be provided by a reorganized PSAT Senior Steering Group, rechartered into a standing Product Support Executive Council. The executive group's efforts will be aligned with other related senior-level groups, such as the Maintenance Executive Steering Committee, the Joint Logistics Board, the Weapon Systems Lifecycle Management Group, and the DoD Logistics Human Capital Executive Steering Group.

Transforming Product Support

Acquisition processes pay too little attention to supportability and consistently trade downstream sustainability for required capability or program survival. Some program managers assert that logistics is their only discretionary account, making it a frequent target for inevitable resource reductions. In acquisition decision reviews, sustainment is often relegated to the back-up charts. Hampered by functionally stovepiped organizational structures and lacking life cycle management qualifications in their diverse workforce, the logistics community fails to achieve effectively integrated and affordable warfighter operational readiness. Instead, it remains focused on managing commodities, parts, and services.

Transforming product support will require not only strong leadership in DoD, but also an open-minded, reform-driven DoD-congressional partnership and a collaborative DoD-industry relationship to realize the report objectives. The national security and economic environments dictate tough-minded acquisition reform and logistics transformation. The challenges of affordability constraints; the need to upgrade equipment and infrastructure; and a continuing, persistent operations tempo prescribe a clear need for DoD implementation of an integrated plan to address product support across the defense enterprise. Successful change in weapons system product support will be demonstrable by reducing costs while maintaining equal or greater equipment readiness support for key warfighting capabilities.

It is crucial to our national interest to ensure that product support achieves a level of performance equal to its importance. The PSAT effort, inspired by a warfighter-driven operational perspective, offers clearly defined, implementable recommendations to drive the next generation of product support strategies toward that objective, with a clear vision to achieve aligned and synchronized operational, acquisition, and sustainment communities working together to deliver required and affordable warfighter outcomes.

The author welcomes comments and questions and can be contacted at randy.fowler@osd.mil.



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Test and Evaluation at the Speed of Need

Steven Hutchison



Department of Defense acquisition is always under the watchful eye of Congress. In 2009, Congress passed the Weapon Systems Acquisition Reform Act, which made several changes to DoD acquisition organizations and processes. More recently, Congress passed and the president signed the National Defense Authorization Act for fiscal year 2010, becoming Public Law 111-84, directing long overdue changes in DoD acquisition of information technologies. According to section 804 of the law, "The Secretary of Defense shall develop and implement a new acquisition process for information technology systems."

Hutchison is the test and evaluation executive with the Defense Information Systems Agency.

The law requires DoD to base the new acquisition process on recommendations in the March 2009 Report of the Defense Science Board Task Force on Department of Defense Policies and Procedures for the Acquisition of Information Technology (DSB-IT). The report recommends an agile model for acquiring IT similar to successful commercial practices (see <www.acq.osd.mil/dsb/reports.htm>). Interestingly, a second DSB report also issued in March 2009, the Report of the Defense Science Board Task Force on Achieving Interoperability in a Net Centric Environment (DSB-NC), made recommendations to ensure that IT acquisition delivers information-assured, interoperable capabilities essential to modern warfighting. Together, the two reports should be used as the foundation on which to build the new model for acquisition and testing of IT. This article attempts to connect them and fill the remaining gaps necessary to truly attain agile processes that foster rapid acquisition of enhanced IT capabilities for the warfighter.

Acquisition and Testing of IT

DoD acquires IT using the same acquisition model as for tanks, ships, and planes. A chart of the familiar Defense Acquisition Management System, taken from DoD Instruction 5000.02, can be found at <<https://acc.dau.mil/CommunityBrowser.aspx?id=294453>>. The system essentially makes no distinction between major defense acquisition programs and major automated information systems, and program managers for IT capabilities manage programs using the same set of milestones and decision points and are subject to the same governance processes and oversight. Make no mistake—this system has produced the best military equipment in the world, but in recognizing this fact, it is important to realize that the process works well when there is a long time between user need definition (at the beginning of the Defense Acquisition Management System) and declaration of initial operational capability (subsequent to the final decision point on

the chart). Therein lies the problem for IT: the fundamental reason this model does not work well for IT capabilities is that we typically want a very short time between user need definition and initial operational capability.

The DSB-IT describes the current DoD IT acquisition process as a “big bang approach,” meaning we try to get everything in the first increment. The report describes the approach as one that “begins with an analysis phase followed by an equally long development phase that culminates in a single test and evaluation event.” The DSB-IT cited an analysis conducted by the assistant secretary of defense for networks and information integration of 32 major automated information systems that showed the average time to deliver an initial capability is 91 months! Figure 1, taken from the DSB-IT report, summarizes the length of time spent in each phase of the acquisition system according to the ASD(NII) analysis. The DSB-IT concludes, “The conventional DoD acquisition process is too long and cumbersome to fit the needs of the many systems that require continuous changes and upgrades.”

The DSB-IT reached the conclusion that current acquisition policies and processes (as defined in the DoD 5000 series directive and instruction) “do not address the fundamental challenges of acquiring information technology for its range of uses in DoD. Instead, a new acquisition approach is needed that is consistent with rapid IT development cycles and software-dominated acquisitions.” The DSB-IT proposed a new model for acquisition of IT, depicted in Figure 2. The proposed model is agile, based on successful commercial practices, and intended to deliver capability in “release” cycles of approximately 18 months or less. Releases are divided into “iterations” (nominally three iterations per release). Lastly, the model highlights integrated developmental test and operational test.

Test and evaluation is an essential part of the DoD acquisition system. Test and evaluation typically begins with early prototypes and then becomes increasingly complex as testing progresses from individual components to systems, then the system of systems. Likewise, test conditions generally evolve from benign, low-stress lab environments through early operational assessments with a limited user base, to full scale, formal operational test and evaluation on production representative systems with trained users. Figure 3 depicts the flow of test events, all of which are found on the right side of the “systems engineering V” diagram, as shown in the Integrated Defense Acquisition, Technology and Logistics Life

Figure 1. DoD IT Acquisition Timeline

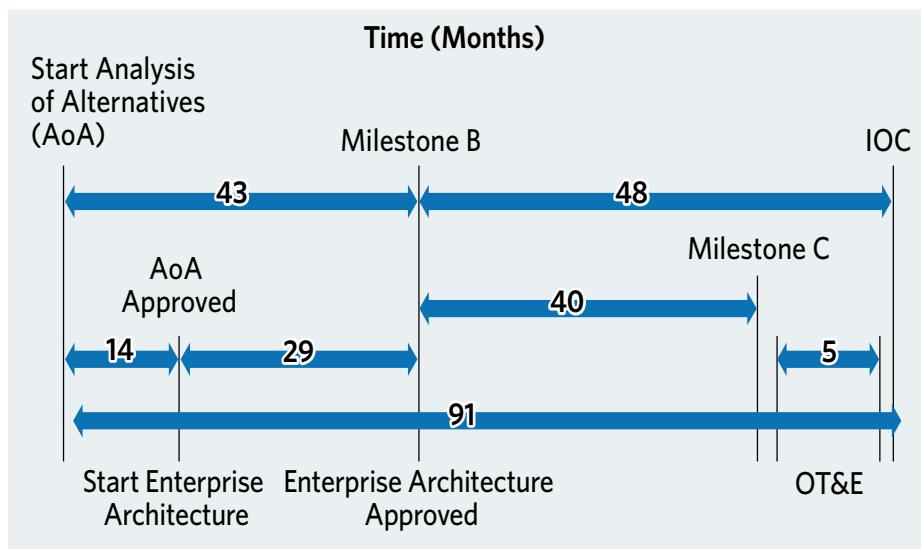
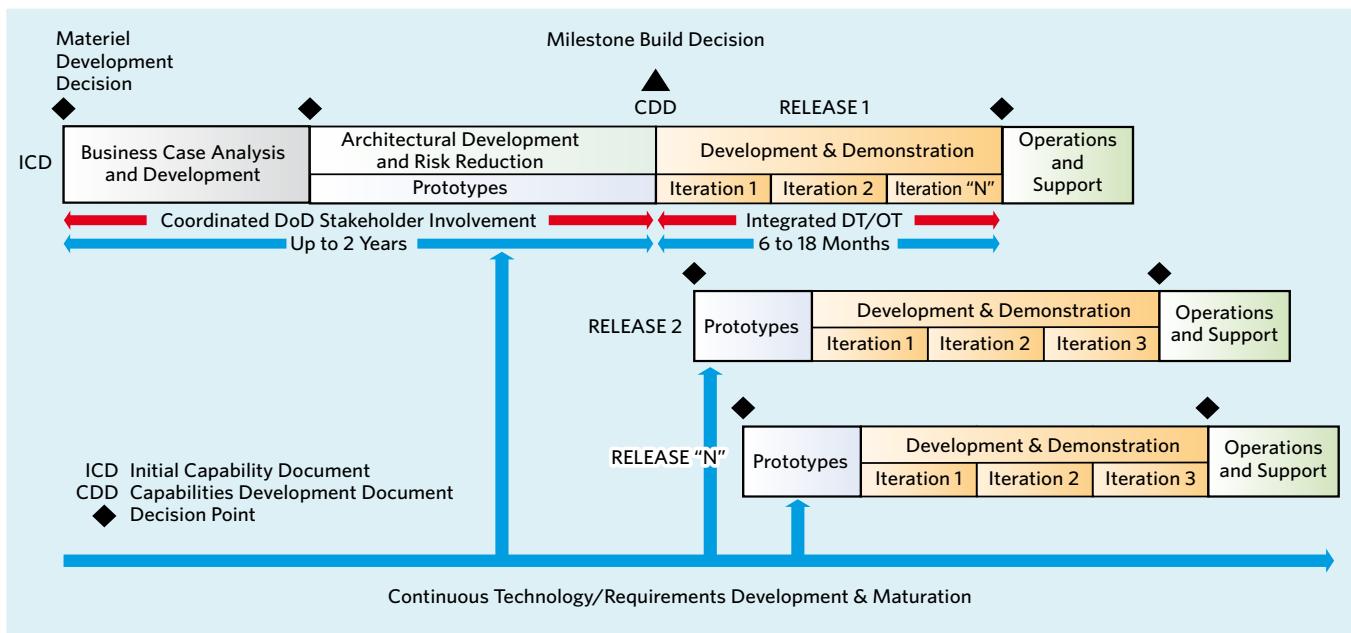


Figure 2. Proposed IT Acquisition Process



Cycle Management System chart (<<https://acc.dau.mil/IFC/index.htm>>). Despite today's increased emphasis on integrated testing, test, evaluation, and certification activities are still concentrated at the end of development. Moreover, the DoD version of the V, as depicted in Figure 3, does not connect the early test activities to the initial operational test and evaluation (IOT&E) or interoperability testing. In an acquisition model designed for IT, we have to transform the traditional one-way V into an iterative process; likewise, testing should be early and often (parallel vs. integrated), and always with a mission focus.

One of the concerns with the process depicted in Figure 3 is that programs engage different test organizations at different times, or change them mid-stream. That is particularly evident in the transition from the developmental tester to the independent operational test agent and may explain the disconnect I've noted. For IT capabilities, the interoperability tester and the security (information assurance) tester conduct assessments and report results for separate decision-making (certification) purposes. The separation of test organizations and activities may have the effect of parsing information to different decision makers as opposed to fusing results into a comprehensive evaluation. As we develop a new IT acquisition model, we should consider a test, evaluation, and certification model that synchronizes the efforts of all test organizations towards improving capability and providing comprehensive information to decision makers.

Test and evaluation has its own big bang in the DoD acquisition system. IOT&E is the culminating event in a T&E strategy and is necessary to achieve a fielding decision. Title 10 USC, §139, mandates IOT&E for major defense acquisition programs for "the purpose of determining the ef-

fectiveness and suitability of the weapons, equipment, or munitions for use in combat by typical military users." DoD 5000 applies that requirement to major automated information systems. IOT&E is a complex endeavor; it takes a long time to plan; and it requires a test unit (sometimes hard to come by in a department at war), time to train the test unit and the testers, a support system, extensive data collection and analysis, and time to prepare reports for decision makers. In 2006, the National Research Council observed that "DoD is fast approaching a period in which a single all-encompassing large-scale operational test, as currently practiced, will cease to be feasible" (Testing of Defense Systems in an Evolutionary Acquisition Environment report). For warfighting platforms that have long developmental timelines, an IOT&E is likely to be a small proportion of the total program cost, and short relative to the total program schedule. That is another factor to consider in development of an IT acquisition model. For IT capabilities following agile development, the current approach to IOT&E could have significant cost and schedule impact. The question is, therefore, how to reduce the impact without loss in rigor and objectivity.

Test, Evaluation, and Certification of DoD IT

Test, evaluation, and certification for IT has several facets. Figure 4 portrays a high-level view of the IOT&E test execution window for IT capabilities. Depicted in the figure are the various test, evaluation, and certification and supporting activities to satisfy the three decision-making processes necessary to field new IT capabilities:

- Joint interoperability certification from the Joint Staff, J6
- Information assurance certification and accreditation (IA C&A) from the designated accrediting authority

- The acquisition decision from the milestone decision authority.

There are likely to be several developmental test activities, such as integration and acceptance testing, which may occur prior to or within the window. Time must be allocated to train users and testers; and the programs have to implement support systems, such as the help desk, as intended to support the fielded system. The IA C&A typically precedes operational test to obtain an authority to test, while interoperability testing may be a separate activity or in conjunction with the operational test. All of those events set the stage for the operational test to confirm that the capability is ready for fielding.

The timeline in Figure 4 depicts a mix of both policy and practice. For example, policy requires a test concept brief 120 days prior to operational test and test plan approval 60 days prior for programs on the T&E oversight list. In practice, operational test duration varies by system; some tests can exceed what is shown by months. Likewise, final evaluation report preparation varies, and the 60 days shown is probably conservative. Hence, the IOT&E test execution window can exceed six months. Figure 4 is not intended to imply that either interoperability or information assurance certification occurs within the time blocks shown; merely that the activities form an essential part of

the IT T&E strategy and must be planned and resourced accordingly.

As I've stated, effectiveness and suitability are not the only considerations for IT capabilities; information systems must also be interoperable and secure. Interoperability certification and the DoD Information Assurance Certification and Accreditation Process (DIACAP) are governed separately from the DoD acquisition system through various DoD and chairman, Joint Chiefs of Staff, directives and instructions. Separate governance processes can be disadvantageous in an acquisition system for IT. For example, it is possible today for the milestone decision authority to make a decision to buy the new capability for the department, while the designated accrediting authority may deny operation on the network. In a new IT acquisition system, interoperability and information assurance processes should be integrated, not separate elements, and the testing activities associated with these certification processes should form an integral part of the IT T&E strategy.

Interoperability

One of the major complaints from the field today is lack of interoperability among the countless information systems at the strategic, operational, and tactical levels. In any new IT acquisition system, it seems clear that we are going to

Figure 3. T&E in the Systems Engineering "V"

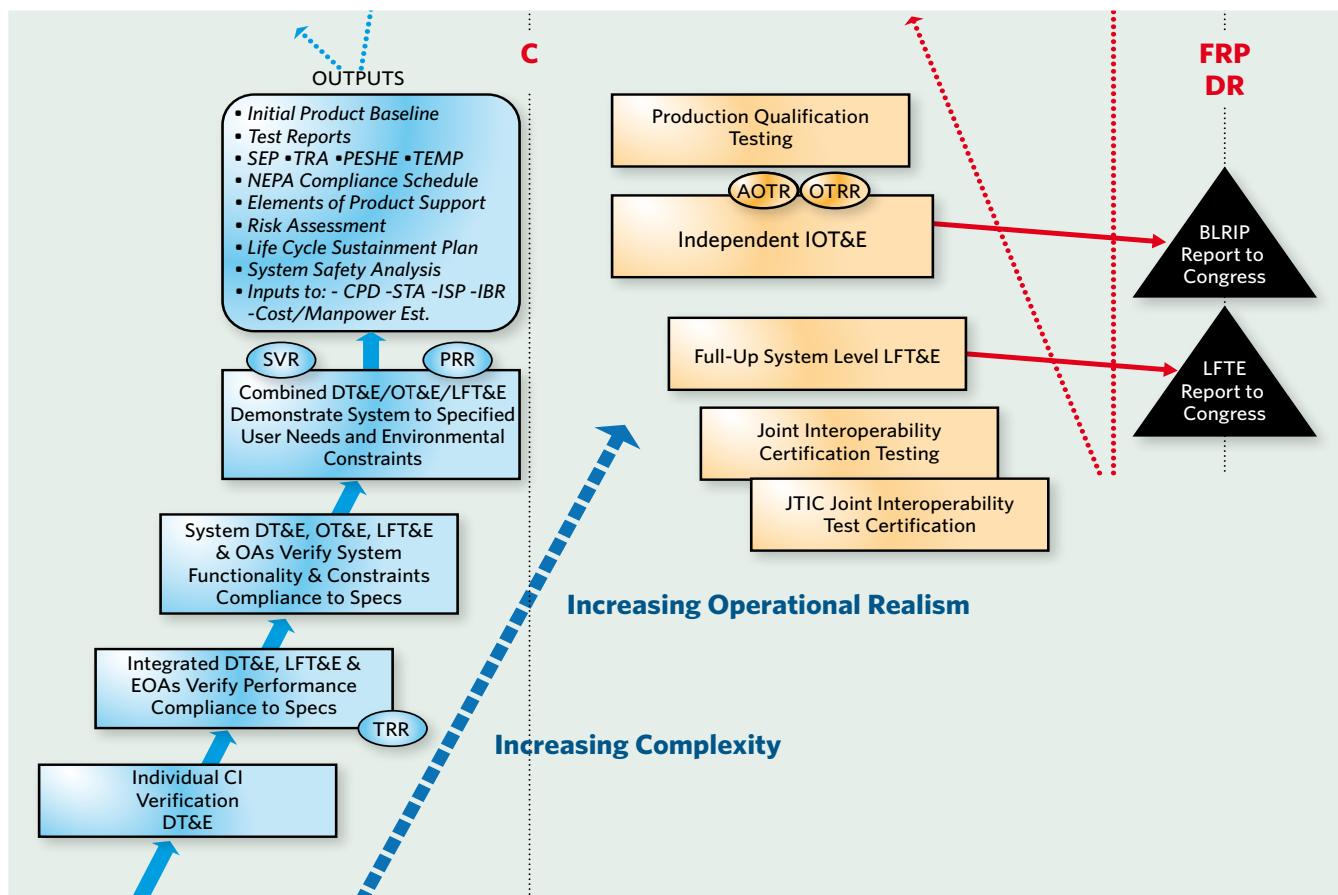
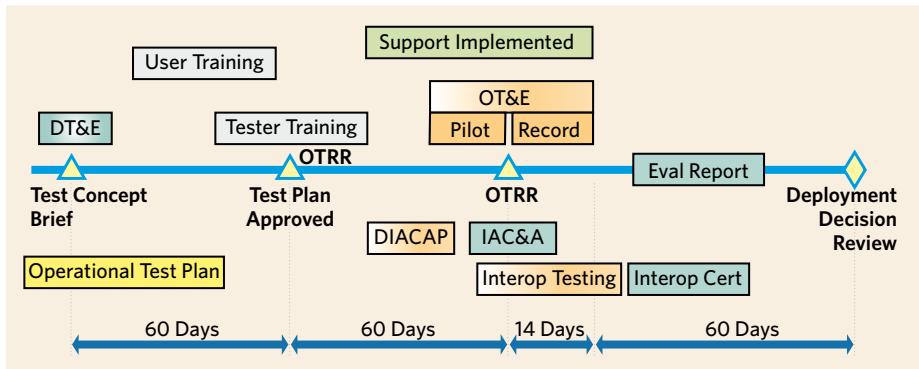


Figure 4. Test Execution Window



have to treat interoperability differently—elevate its place in the decision making process and establish meaningful accountability. The DoDI 5000.02 is weak in describing interoperability considerations and offers very little guidance on interoperability testing. Rather than being overseen by the milestone decision authority, interoperability is managed through a separate decision-making process governed by the DoD 4630 directive and instruction and the Chairman of the Joint Chiefs of Staff Instruction 6212. As a result, joint interoperability testing is not well integrated into the overall T&E strategy of a system. For example, is the program manager responsible for interoperability testing or is the operational test agent? Who approves the interoperability test plan? Should the Joint Staff, J6, sign the T&E master plan?

Interoperability is a key performance parameter, referred to today as the Net-Ready KPP (NR-KPP). The Glossary of Defense Acquisition Terms defines a KPP as a system characteristic “considered critical or essential to the development of an effective military capability.” The interoperability KPP has not been a stable element of the requirements system, however, and the final report of the Defense Acquisition Performance Assessment Project referred to the interoperability KPP as one “for which there is no method of testing.” From August 1999 to present, the interoperability KPP has been defined and redefined four times.

The Interoperability KPP (I-KPP) was first introduced in the Requirements Generation System in the August 1999 issuance of CJCSI 3170.01A. The methodology for assessing the I-KPP based on “information exchange requirements” followed in the May 2000 CJCSI 6212.01B. The Joint Staff canceled the Requirements Generation System in June 2003 and implemented the Joint Capability Integration and Development System (JCIDS) in CJCSI 3170.01C. Then in November 2003, the Joint Staff replaced the I-KPP with the NR-KPP in CJCSI 6212.01C. The NR-KPP moved away from measurable and testable information exchange requirements to technical compliance attributes such as the “Net-Centric Operations and Warfare Reference Model,” “key interface profiles,” and “integrated

architecture products”—none of which were particularly well suited to hands-on testing. In the March 2006 CJCSI 6212.01D, the NR-KPP statement changed to read in more operationally meaningful terms, but the threshold and objective requirements retained the same technical attributes. In December 2008, the NR-KPP changed again; the CJCSI 6212.01E replaced “key interface profiles” with the “Technical Standards/Interfaces” element, deleted the

Net-Centric Operations and Warfare Reference Model, and introduced Global Information Grid Enterprise Service Profiles—again, not readily hands-on testable. Despite the continuous revisions, the NR-KPP remains arguably the least measurable and testable of all the required KPPs. An operationally meaningful, measurable, and testable interoperability KPP will be an essential element of a new IT acquisition system.

Information Assurance

Information assurance is another critical element in IT acquisition and requires security testing. Like interoperability, the DoDI 5000.02 is weak in describing IA considerations and offers little guidance on security testing. Instead of being overseen by the milestone decision authority, IA is governed through the DoD 8500 series and the CJCSI 6510. DoDI 8580.1, Information Assurance in the Defense Acquisition System, does link the two governance processes, though. Security T&E is another category of testing for which we do not have a standard approach in developing the overall T&E strategy; for example, who approves the security test plan? Should the designated accrediting authority sign the T&E master plan?

DoD implemented IA certification and accreditation in December 1997 with the release of the DoDI 5200.40, DoD Information Technology Security Certification and Accreditation Process (DITSCAP). In November 2003, as threats to DoD information systems and networks were becoming increasingly apparent, the CJCSI 6212.01C included IA as an element of the newly defined Net-Ready KPP. In July 2006, the ASD(NII) canceled DITSCAP, issued interim guidance, and then in November 2007, the DIACAP became the process of record with the release of DoDI 8510.01. Completion of the DITSCAP or DIACAP process has essentially equated to satisfying the IA element of the Net-Ready KPP. Completing the DITSCAP or DIACAP process, however, has never been completely satisfying in the overall T&E strategy.

In November 1999, the director, operational test and evaluation, issued the Policy for Operational Test and Evaluation of Information Assurance. The policy required the

independent operational test authorities to assess IA as part of the system evaluation while leveraging to the extent possible other IA testing—such as DITSCAP security T&E—to reduce duplication. In some cases, the policy required “field penetration testing by a Red Team [test team authorized to conduct threat-based computer network operations]” as part of IOT&E. Inclusion of red teams in IOT&E adds a new level of complexity into the already challenging and resource intensive undertaking discussed earlier.

Unlike joint interoperability certification, which has a single process owner and single tester (although a recent change to the CJCSI 6212 permits testing within the components for designated programs), IA has many owners and many testers. In our current IA certification and accreditation process, each information system has a designated accrediting authority appointed by the component head or the mission area principal accrediting authority. The designated accrediting authority is responsible for the decision to accredit, and may authorize or deny operation or testing of their assigned information systems. The combined effect of multiple decision authorities and multiple test organizations is likely to contribute more to delay and inconsistency than efficiency and standardization. The Defense Science Board Task Force on Achieving Interoperability in a Net Centric Environment described the problem in these terms:

Multiple certification processes and inconsistent retest processes exist, often resulting in the delivery of obsolete products or products that are no longer supported. Current test, evaluation, and certification (TE&C) processes take months and often years. In a wartime environment where information and technical capability is becoming more and more critical to the warfighter, a delay of months or years for redundant testing to deliver a new capability is unacceptable.

The Defense Science Board Task Force observed that one cause of redundant testing is that “Testing, evaluation, and certification that are performed by one Service or one agency are most often not accepted by other Services or agencies.” The Defense Science Board therefore recommended a new mandate: “Test by one, accept by all.” On July 23, 2009, DoD principal accrediting authorities signed a policy for reciprocity to accept each other’s security assessments (DoD Memorandum, Subject: DoD Information System Certification and Accreditation Reciprocity). The policy is a very positive step towards reducing redundancy and streamlining capability delivery to the enterprise.

As stated, the DSB-IT recommended a new, agile IT acquisition system. To its credit, the DSB-IT described the capability at each iteration as “tested and potentially deployable,” and highlighted integrated developmental test/operational test (refer back to Figure 2). Unfortunately, the DSB-IT retained an essentially status quo T&E approach, writing: “Following the nominal completion of three iterations, an initial opera-

tional test and evaluation is accomplished prior to operationally fielding a release.” That may not be the most efficient model. For example, capability developed and tested in early iterations is likely to be tested again in IOT&E. Moreover, if we conduct the IOT&E as we do it today (six months of test, evaluation, and certification activities), then the desired 18-month release cycle may in reality approach 24 months. More important, however, is that potentially deployable capability may be withheld from fielding until completion of the release and IOT&E. While this approach has the well-intentioned effect of reducing the churn of multiple fieldings on the operational force, it is not agile. Therefore, we might consider a model where the decision to field, whether at iteration or release, is at the discretion of the gaining commander. Regardless of whether we test iteration or release, we are going to need a new T&E model that is responsive to agile IT programs.

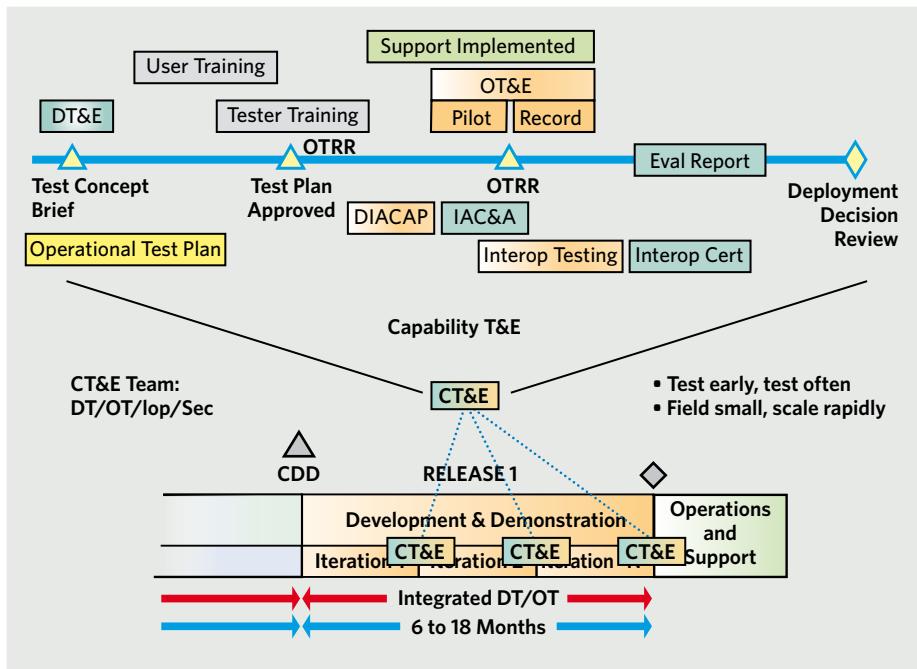
Towards an Agile IT Acquisition and Test, Evaluation, and Certification System

The preceding sections have made the case that acquisition of information technology in DoD consists of multiple processes that do not necessarily share the goal of rapid delivery of enhanced capabilities to the warfighter. We lack an overarching process specifically designed for fielding IT capabilities to the enterprise. Likewise, we have challenges to overcome to create truly integrated test, evaluation, and certification processes that ensure capabilities are effective, suitable, interoperable, and secure.

From beginning to end—requirements definition; capability development; test, evaluation, and certification; governance; and operations—the department lacks agile processes designed for IT. An agile IT acquisition model must begin with

**The fundamental reason
the Defense Acquisition
Management System
model does not work well
for IT capabilities is that
we typically want a very
short time between user
need definition and initial
operational capability.**

Figure 5. Agile T&E



agility in the requirements system; thus, one consideration (beyond the scope of this article) would be to develop a JCIDS-light requirements system for IT. An agile IT requirements system must shift from the current big bang, "everything in the first increment" approach to prioritizing capability needs for delivery in a series of little bangs. Additionally, we need operationally meaningful KPPs for interoperability and security.

An agile IT acquisition model requires agile oversight, so management and governance processes must be redesigned to foster rapid development and fielding cycles. DoD business IT systems have already moved to a business capability life cycle (BCL) management process intended to be more flexible. The BCL "merges three major DoD processes (JCIDS, the DoD 5000 Acquisition System, and the Investment Review Board/Defense Business System Management Committee governance bodies) to provide a single governance and decision support framework to enable faster delivery of business capabilities" (see <<http://www.bta.mil/products/bcl.html>>). The BCL leverages the Enterprise Risk Assessment Methodology "to reduce systemic risk and support informed decision making" (see <<http://www.bta.mil/products/eram.html>>). Similar governance approaches could be adopted within the warfighting, intelligence, and enterprise-information environment portfolios as well.

As requirements processes become more agile, programs will shift to design-build cycles based on prioritized requirements. Whereas the traditional systems engineering "V" model has the appearance of being a one-way path, the agile development life cycle is more iterative and less sequential. The test, evaluation, and certification community must be ready to en-

gage agile programs through equally agile processes; the six-month test-execution window that occurs at the end of an increment today has to be shortened and moved well left in the schedule to focus on the development iterations. A key element of tester agility will be formation of a capability test team to merge the traditional developmental test, operational test, interoperability, and security test activities into a comprehensive test, evaluation, and certification strategy.

Our objective in T&E should be mission-focused agility: rapidly composable mission-oriented test plans that permit objective assessments of technical and operational capabilities and limitations in each iteration. Likewise, we need agile DIACAP and interoperability certification, where "test by one, accept by all" is the norm.

For capabilities developed in six-month iterations, the capability test team should be able to complete the entire test execution window—plan, execute, report—in six weeks or less. Figure 5 depicts the test, evaluation, and certification paradigm shift. That can be accomplished only through a highly collaborative process that is responsive to changing requirements priorities and developer agility. Essential to the approach will be early and continuous involvement from the user community. In the model, the overarching theme is "build a little, test a little (learn a lot), field a little." Then as capabilities are deployed, the fielding paradigm should be "start small, scale rapidly," while continuously monitoring to ensure the capability performs as desired.

Implement an Agile Process Now

Information technologies evolve rapidly, as is abundantly evident in the commercial sector. As DoD acquires IT to enhance warfighting capabilities, we need to become more agile. Agility cannot just occur in capability development either; all aspects of the IT acquisition system must be redesigned for agility. To be responsive to operational requirements, and to ensure the capabilities work as intended, test, evaluation, and certification must move at the speed of need. The Defense Science Board reports provide a good starting point from which to build a new model for acquisition of IT; now let's take the next bold step to implement agile processes that deliver enhanced IT capabilities for the warfighter.

The author welcomes comments and questions and can be contacted at steven.hutchison@disa.mil.



We Don't Dance Well

Government and Industry
Defense Materiel
Acquisition

Steve Mills



Department of Defense acquisition programs continue to experience significant challenges in the areas of cost, schedule, and performance. The defense acquisition workforce, elected officials, and other key stakeholders continue to seek ways to improve acquisition processes and systems to meet the needs of the warfighter. Numerous pro-

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cesses, policies, and business approaches have been implemented to address those challenges, which have achieved various degrees of success. The latest attempt to address those challenges is the revised DoD Instruction 5000.02. The changes found in DoDI 5000.02 primarily focus on the early achievement of technology maturity using competitive prototyping prior to Milestone B and rigorous system engineering. Those activities are extremely important and critical to successful acquisition outcomes; however, is the department continuing to miss the mark on other low-cost, high-payoff opportunities to improve overall program performance? Are there practical measures that can be pursued to improve acquisition performance? The answer to both of those questions is an emphatic yes. Acquisition program performance can be greatly improved by focusing on DoD's relationship with industry, particularly in the following areas:

- Understanding and perspective
- Communication
- Education.

DoD's Perception of Industry

Many members of the defense acquisition workforce fail to appreciate the importance of their relationship with industry partners regarding program performance. Yet DoD and industry need to work closely together. In the Sept. 14, 2009, issue of *Federal Times*, Under Secretary of Defense for Acquisition, Technology and Logistics Ashton Carter put that point into perspective when he said, "I am not a believer that the defense industry is the enemy; they are our partners. We can't arm and defend the country without private industry."

Acquisition employees within the department must acknowledge that private industry builds the necessary products for the warfighter and is a critical member of the materiel acquisition team. That point seems to be forgotten by some acquisition workforce members. A healthy and engaging relationship with industry partners is a critical component of any program and will surely impact—positively or negatively—its cost, schedule, and performance. How can government-led, industry-supported integrated product teams (IPTs) be expected to solve functional program challenges if the underlying relationship between the public and private acquisition communities is inherently flawed? The department must strive to develop, foster, and maintain a positive, healthy relationship with its industry partners.

Also, some in government, including many members of the defense acquisition workforce, fail to understand profit's importance to industry. Reasonable profit is not only a beneficial outcome for private firms but is actually a critical element of success for the department as well. Profit is required for companies to remain in business and for competition to exist, which is also necessary to maintain a robust military industrial base.

Finally, many defense acquisition workforce personnel often fail to appreciate how the performance of their private industry colleagues is impacted by government actions. Poorly written request for proposals (RFPs) and contracts have a negative impact on industry performance. Private firms require clear and stable requirements to perform at maximum efficiency. Clear, concise, and discernable program requirements support effective resource management and cost control. Unexpected requirements changes during program execution, while sometimes unavoidable, rarely have a positive impact on acquisition programs.

Industry's Perspective of DoD

Some employees of private industry supporting defense acquisition programs possess a healthy understanding of their government customers and teammates. Unfortunately, many others lack that understanding, and that lack of perspective degrades overall program performance in several ways. Both government and industry must have a common understanding of the government's materiel acquisition process. Regrettably, the primary components of materiel acquisition as embodied in DoDI 5000.02 are unfamiliar to many employees in private industry. It is therefore incumbent upon government acquisition professionals to educate their industry partners in the acquisition process. The critical importance of education for both government and industry professionals is addressed at greater length at a later point in this article.

Clear Communication at All Levels

Communication between the government and private industry with regard to materiel acquisition programs generally begins during the solicitation process and is primarily achieved through written media. The best example of early program communication is the government-developed RFPs. While most personnel in the government and industry are familiar with the RFP and its accompanying processes, many fail to understand the critical importance of the communication taking place at that time. The government must provide clear program requirements when developing and publishing RFPs, which leads to stronger communication later in the program's life cycle.

Often, however, the government fails to produce a quality RFP that solicits a greater exchange of dialog between the government and industry. How can a material acquisition program be expected to successfully adhere to cost, schedule, and performance parameters when the RFP is flawed? A poorly written government RFP can adversely affect program execution. In general, private industry goes to great lengths to train and manage resources in order to facilitate proposal development with intensive training and staffing. Industry responds to government RFPs with strategically planned and artfully executed proposals, as demonstrated by the numerous high-quality proposals provided to the government. While acquisition workforce members

receive training on the preparation of solicitations, to include RFP preparation, the training fails to be in the quality and density of our industry partners. The acute differences between the experience and resources of government and industry create an unhealthy balance, which can negatively impact program start up, execution, and performance. An imbalance of expertise and resources also increases the opportunity for contractor protests.

Private industry representatives should strive for openness with their government customer. Openness with the customer will encourage and increase trust, which is a critical component of effective program execution. During the program's execution, private firms should promote government involvement, where appropriate, so as to build and maintain a strong level of trust. Direct, proactive engagement by industry with the government mitigates overall program risk and is the best approach for all concerned. Through direct engagement and effective communication, resolution of program challenges can be achieved. Both government and industry must ensure that effective communication at all levels is a tool for problem resolution.

Another area of less-than-optimal communication between the government and industry during program execution consistently occurs with the various program IPTs. Day-to-day activities and communication at the IPT level are critical components of program execution. IPTs are the problem-solving bodies for acquisition programs. If managed appropriately, the teams also provide a forum for effective communication and conflict resolution. Employees of both government and industry must be well-versed in how to operate as members of IPTs in order to receive the maximum benefit. Defense acquisition workforce members receive effective training on how IPTs should work, why the entities are important, and how to maximize the effectiveness of the team in the Intermediate Systems Acquisition (ACQ 201) course offered by the Defense Acquisition University. The course is a requirement for most members of the defense acquisition workforce. Examples of the IPT tenets taught in the course are:

IPT Barriers

- Lack of empowerment
- Unclear goals
- Poor leadership
- Unreasonable schedule
- Insufficient resources
- Lack of commitment.

IPT Aids

- Clear goals/charter
- Willing participants
- Right expertise
- Good communication
- Top management support
- Early resolution of issues.



More focused training for both government and industry personnel will reduce overall program risks and increase program performance.

DAU courses place considerable emphasis on the importance of IPTs; and the university's emphasis on IPTs, coupled with real-world experience in defense acquisition, provides defense acquisition workforce members with a solid understanding of the IPT process. Employees of private industry, however, may not always understand the importance of DoD's IPT processes, and IPTs may simply represent another obligatory meeting with their government counterparts. A clear understanding and application of the tenets of IPT membership by industry will have a positive effect on overall program performance. Industry members can gain a stronger understanding of the IPT and their benefits by attendance and completion of the ACQ 201 course taught by DAU.

Education

This article has discussed the challenges in both perspective and communication between government and industry in the execution of materiel acquisition programs, and many readers would agree that the challenges do exist. The key to overcoming those challenges is through education and leadership emphasis on application. Both DoD and industry expend considerable amounts of time and financial resources to educate personnel, but does the current educational model represent the best use of available re



"I am not a believer that the defense industry is the enemy; they are our partners. We can't arm and defend the country without private industry."

USD(AT&L) Ashton Carter

sources? Although the answer to this question is not readily apparent, it is clear that both the government and private industry often forfeit opportunities to provide their respective teammates with the necessary skills regarding defense materiel acquisition programs.

For both government and industry, education and application are enabling mechanisms that will positively or negatively affect the cost, schedule, and performance of defense acquisition programs. All acquisition community professionals—government and industry—require high-quality, targeted training. Areas that require additional focus for both government and industry employees are:

- **Requirements Development/Management**—Development, understanding, and management of user requirements is one of the cornerstones of the Defense Acquisition System. The ability to perform those critical functions is essential to the overall success of any defense acquisition program. Both the government and industry require additional training and expertise in this critical area.
- **RFP Development and Execution**—RFP development is the beginning of the department's acquisition process. The

RFP provides user requirements for industry and is the source selection component used to differentiate among offerors. The end result of the RFP and the solicitation process is to select the best-value offeror. The RFP is a critical component of a successful materiel acquisition program. The government clearly has room for improvement in that area. Poorly written and executed RFPs are a contributing factor to the large number of industry protests and poor program performance.

- **Program Management from the Industry Perspective**—Defense acquisition workforce employees, in many cases, do not have an appreciation for the way private industry executes programs. For example, industry standards in program and project management follow guidelines set forth by the Project Management Institute and are embodied in the Project Management Book of Knowledge (PMBOK®). While the parallels between government acquisition management and its public sector counterpart are significant, in practice, few members of the defense acquisition workforce are aware of the industry approach to project and program management. Workforce members' clear understanding and appreciation of those principles would be beneficial to many defense acquisition programs. Furthermore, industry certification and expertise could be used more as a program management or management volume source selection component to assist in determining the best value offeror.

The Way Forward: How to Improve

Several things can be done to address the challenges posed by the incongruous perspectives held by both government and industry. Firstly, while DAU provides a solid set of tools for government employees, industry employees require similar tools as well. Attendance in DAU acquisition courses is an available option for industry representatives; however, employees of private firms consistently fail to fully use such opportunities.

Currently, there is limited incentive for industry attendance. One way to improve industry participation in DAU courses would be for DoD to offer some form of acquisition certification similar to that provided to department employees by the Defense Acquisition Workforce Improvement Act. Currently, only government personnel are eligible to receive DAWIA certification.

Another opportunity to foster a better understanding between government and industry personnel would be to promote industry-standard credentials as a value-added or as a career progression option for DoD acquisition workforce employees. Numerous opportunities exist for this in the private sector, courtesy of the Program Management Institute, including:

- Certified Associate in Project Management (CAPM) for IPT members
- Project Management Professional (PMP) for Project/Program Managers

- Program Management Institute-Risk Management Professional and Scheduling Professional for select individuals

Applicable commercial engineering, information technology, contracting, logistics, and other career field credentials exist as well. Providing the defense acquisition workforce members incentives to seek those industry-standard credentials will convey badly needed insight into how the department's industry partners conduct business.

More focused training for both government and industry personnel will reduce overall program risks and increase program performance. Increased spending and emphasis on the education of the acquisition workforce is already a departmental priority. The cost to improve the education of the workforce is a relatively small investment in decreasing program risk, especially when compared to the costs of recent program overruns.

Another advantage of additional training and education for the workforce is that it will demonstrate leadership's commitment to the professional development of the individual. That applies to both government and industry. The department must figure out how to make the professional development of its private partners part of its acquisition programs, and one opportunity is to introduce additional industry-DoD partnership training to select DAU courses that have the greatest impact on the acquisition workforce and potentially industry. ACQ 201 is such a course. The course provides an in-depth overview of the defense acquisition processes and is a DAWIA requirement for most of the government acquisition workforce members if they are to reach various certification levels in their respective career fields. Currently, the course is composed of two parts—an online, self-paced course and a traditional classroom course. While the course provides tangible results in its current form, extending it from a one-week to a two-week classroom-based course would be a step in the right direction. Additional content could be added, including supplementary, in-depth IPT problem-solving exercises. Adding additional content and coupled with increased industry attendance would help address many of the challenges discussed previously.

DoD acquisition programs function as a team effort between DoD and industry. The difficult process remains challenging from the perspective of cost, schedule, technical performance, and risk. Improvements in program execution through education and communication are possible without incurring great expense and conducting excessive analysis. All the training in the world is only effective if it is applied, which underscores the importance of leadership in both government and industry.

The author welcomes comments and questions and can be contacted at steve.mills@dau.mil.



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For more information, call 703-960-6802 or 800-755-8805, or e-mail [dauaa2\(at\)aol.com](mailto:dauaa2(at)aol.com).

Did You Remember to DID?

Art Greenlee



Congratulations! You have just become a new program manager! The outgoing program manager, however, has implied the program you just inherited seems to lack strong communication and essential coordination among its integrated product teams, and team members are over-protecting information between government and contractor teams. No one wants to share key data. Everybody is too guarded. To make matters worse, certain

Greenlee is the director of mission assistance and rapid-deployment training at DAU.

IPTs are surprised that leadership has not implemented some key information-dissemination initiatives that are so essential to the upcoming engineering, manufacturing, and development phase. After reflecting on those apparent issues, you wonder what action you need to take first. You and your team suspect your success will be invariably shaped by your initial decisions.

With respect to individual or organizational performance, there is considerable literature written on the importance of having the right focus and the right planning, and, of course, rightly executing the plan. The experts say it should all be based on "defined performance measures." And whether leading a team, your program, or an organization, there are three critical actions to keep in mind: carefully develop the needed information, share it with all who need to know, and codify it for future reference. In other words, Define, Inform, and Document (DID).

Successful Performance Strategy

In her *Performance Consulting Field Book* (2007), Judith Hale identifies groups of interventions that consultants need to have at their disposal to improve performance at individual, team/group, or organizational levels. She goes on to say that information-focused interventions represent the first and most important of the performance strategy groups. Within the group are three intervention approaches: define, inform, and document. Basing her reasoning on her more than 25 years of corporate and government consulting experience, Hale considers those important because:

- They are frequently the only thing you may need to do right to improve performance.
- They support most, if not all, other recommendations for improvement.
- If not done right or overlooked, it will greatly reduce the program effectiveness and lead to the possible failure of other performance strategies.

So, in your program planning and execution phase, did you DID? If you did not, a brief coverage of each of the overlapping strategies will serve as a reminder, especially as they relate to defense acquisition program management practices. Knowing how to apply the strategies could be just what's needed to enable more successful outcomes.

Define

The first component imperative—define—has been highlighted by many problem-solving models. It's usually stated in a simple and straightforward way: "Did you define the problem and search for causal factors?" Subsequent objectives and alternative approaches to solving the problem should be carefully developed and clearly articulated as well. In the Defense Acquisition Management System framework, a validated and approved initial capabilities document defines the required need, problem, or gap to be met. As a part of the pre-acquisition activities, all planning efforts focus on defining system and program goals, requirements, and sub-

sequent resources to execute the program. A well-defined analysis of alternatives, technology development strategy, component cost estimate, and even draft capabilities development document in place at Milestone A will facilitate success through the technology development phase. Risk reduction and technology maturity activities such as competitive prototyping are enhanced by successful definition of performance requirements and technical management strategies, including test, logistics, manufacturing, and other technical strategies. Within the program, a well-defined organization structure with well-defined teams with well-defined roles and responsibilities are key enablers to successful program execution among government and contractor teams. As long as each IPT chief gives team members a defined role (or roles) and clear direction and seeks buy in by the team members, the IPT will most likely be a strong and focused team.

Spending the right attention and the right amount of time on defining upfront can produce huge dividends. For example:

- Defining strengths, weakness, opportunities, and threats (also known as a SWOT analysis) is a very useful method in identifying potential issues, hidden agendas, and competing egos.
- Defining a risk management approach during pre-systems acquisition activities facilitates risk planning, identification, analysis, and mitigation approaches to combat cost, schedule, and performance hurdles.

A well-defined acquisition strategy better secures program approval at Milestone B because all implementation options are weighed against known risks and mitigation strategies are defined to ultimately meet the user's warfighter capability (defined in the capability development document) in a timely and affordable manner.

The acquisition strategy also ensures technical and business strategies are defined and integrated into one overarching approach to achieve objective program goals. A few examples of strategies:

- Contracting approaches must be well-defined to help contractors contain cost and reduce risk throughout the design, development, demonstration, delivery, and deployment of capability to the end user, including the disposal of a system at the end of its useful life.
- Systems engineering plans must define the overall technical management approach for the program and ensure key processes—such as test, logistics, and manufacturing—are defined and integrated to provide sustained combat capability.
- Cost, schedule, and performance goals must be defined in an acquisition program baseline.
- All essential documentation must be defined, integrated, and prepared for Milestone B, which itself defines and certifies the program of record. Exit criteria are established for the next phase and are defined and documented in the acquisition decision memorandum.

With all the program planning and organization defined, how do you communicate your plan of attack to your team(s) to execute program priorities? A comprehensive communications plan uses what's been defined and informs (the second key component to DID) government and contractor teams of the essential program execution strategies.

Inform

Inform means communicating to internal and external stakeholders what was defined, expected, discovered, concluded, or changed. While defining sets the stage, establishes the direction, and facilitates buy in, informing gets the word out. Well-planned information tools provide all the necessary guidance to conduct the overall job. They also incorporate a feedback mechanism in order to measure how tasks were performed per the defined plan and can later accommodate for adjustments. Knowing expectations greatly contributes to a satisfied, productive program management team. It is not enough to have all the planning and plans in place, however. Information performance strategies ensure the people who need to know know, and such strategies survive regardless of information or people changes.

Information dissemination can be accomplished by either written or oral communication. The challenge is when and how to use written or oral communication to get the word out to facilitate successful program execution. Activities like morning stand-up meetings—a best practice to communicate daily priorities—usually take no more than 15 minutes, and such meetings require all attendees to stand up and brief the priorities for the day. Stand-ups promote communication within and among IPTs. Other simple information tools, such as meeting agendas and minutes with action items, apprise participants and leadership of key decisions and next steps. Quad charts, dashboards, home pages, portal sites, internal newsletters, and “war rooms” are all methods of getting the information to the right people at the right time for the right purpose in order to gain program traction and ultimately achieve objective results.

Telepresence, video teleconferencing, GoToMeeting® gatherings, and other Web-based tools such as podcasts, portals, and microblogging sites inform decision makers and team members in real time about crucial recommendations/decisions so they stay informed. Informing all stake-

holders across and up the acquisition chain of command is imperative during a program's life cycle. Tradeoff decisions are constantly assessed to ensure a design is affordable, verifiable, supportable, and producible. Consequently, program personnel need to be fully engaged to manage risks and ensure the program/system is meeting its goals. On-going communication and knowledge sharing must go on between and among government and contractor teams from beginning to end and within each life cycle phase.

**Whether leading a team,
your program, or an
organization, there are three
critical actions to keep in
mind: Define, Inform, and
Document.**

Information strategies also need to be adjusted when information changes, people change, or poor performance starts to surface. Feedback tools, like climate surveys, provide organizations with a pulse of the organization, ensuring communication and knowledge-sharing enablers are periodically assessed, and feedback tools that are implemented can contribute to successful program execution and outcomes.

Document

Document, the final component of DID, captures and preserves key program information/documentation. Documenting key decisions, recommendations, and direction helps frame, organize, control, and guide future action. “No job is done until the paperwork is complete” is a common phrase that cannot be emphasized enough by leadership. History has shown that it is vitally important to capture critical program information and the subsequent actions taken. From documenting initial technical and business processes to capturing helpful lessons learned and best practices, collecting and documenting information must be useful and purposeful.

Every organization should consider how to best codify and learn from program decisions and subsequent actions. No one appreciates having to reinvent the wheel, relearn someone else's past failures, or unnecessarily retrace what's already taken place unless a root cause analysis is required. Organizations can be well-served by establishing accessible knowledge management systems for their respective workforces for reference and guidance as they plan and execute their responsibilities. For example, policy documents, directives, operating instructions, flow charts, and other job aids should be appropriately documented and available for all to retrieve. Information aids such as help screens and other useful navigation and training features have proved to lessen the burden of having to painfully learn another new system.

Well-established program documentation methods that capture decisions, execution actions, and program baselines help convey the progress. For example, at each milestone review, an acquisition decision memorandum documents the program's authority to proceed or not and documents key exit criteria that are the key "gates of success" programs must accomplish prior to the next major review/milestone. Situation reports and weekly activity reports note what significant events/decisions took place on a program. They also inform key stakeholders/advocates and maintain a documented historical account.

Admittedly, we learn lessons more than once. Given the sense of urgency in the acquisition field, there is a natural tendency to go onto the next action without taking time to reflect and learn from past experiences. Organizations that have become learning organizations now promote learning libraries that document individual, team, or organizational experiences. Capturing what worked, what didn't, and what needs to happen next time are all relevant when trying to document "what did I/we learn from this event/decision?" Communities of practice can be an invaluable way to broadcast best practices and lessons learned. Whether it is sharing information about a technical event such as a developmental or operational test or business function such as cost estimating, source selection, or earned value management, what was learned must be carefully documented. If we don't document what we've done and learned, then we are still just practicing.

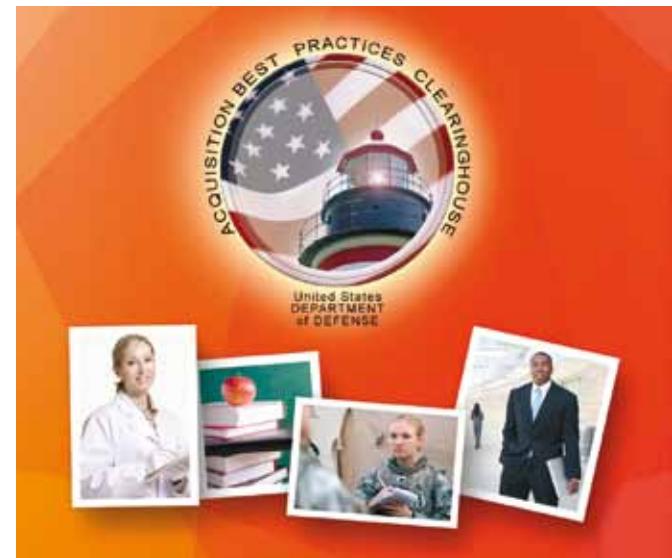
A disciplined documentation approach also gives us an opportunity to reward our people for their exceptional job performance. Documenting accomplishments make end-of-year reporting or periodic award submittals less of a chore and more of a justifiable result where we can recognize our people for the great work they've done.

Did You DID?

If you haven't DID, you may want to consider Judith Hale's information-focused strategy, which focuses on boosting the three major communication components of define, inform, and document. If you do, both you and your organization are bound to reap the benefits. Your plans will start to crystallize, your people will start to visualize, and your programs will start to energize. More important, the warfighters will be the beneficiaries of more cost-effective and more robust weapon systems that find their way into combat operations and/or support of combat operations. And that's what matter most.

Robert Tremaine, the associate dean for outreach and mission assistance at DAU's West Region, contributed to the development of this article.

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Distributed Testing

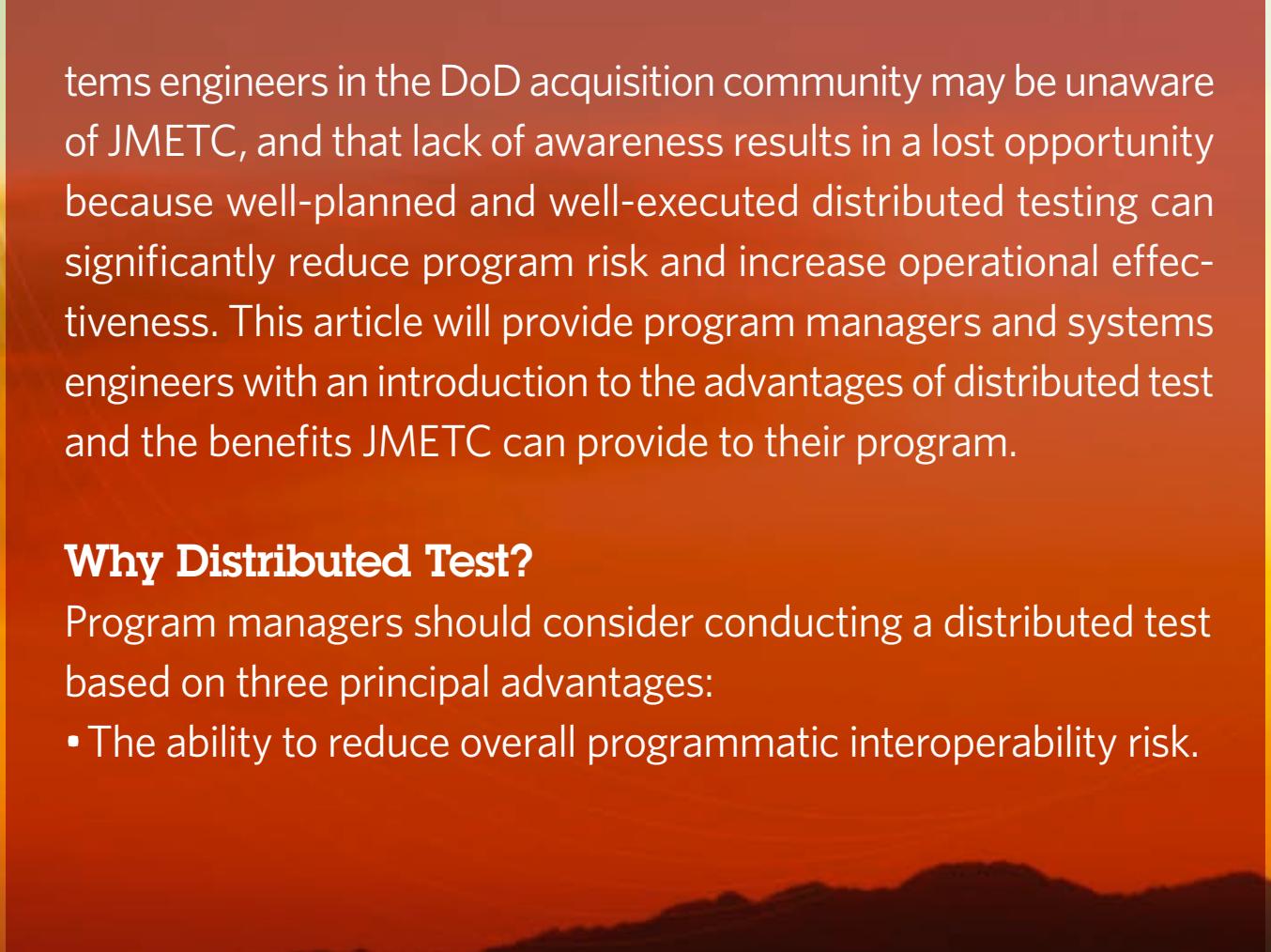
A Significant Tool in the Program Manager's Arsenal

Bernard "Chip" Ferguson ■ Vincent P. DiFronzo



Despite our successes over the last decade in fielding dramatic increases in joint intelligence, surveillance, and reconnaissance capabilities and compressing the find-fix-target-engage-assess timeline, we continue to have many challenges in the joint interoperability regime. That was the reason the 2004 Testing in a Joint Environment Roadmap recommended establishing a DoD-wide distributed test infrastructure. That recommendation led to the establishment and subsequent rapid growth of the Joint Mission Environment Test Capability (JMETC), a distributed test program launched in fiscal year 2007 that is designed and funded to support Department of Defense programs. However, many program managers and sys-

Ferguson is the program manager for the Joint Mission Environment Test Capability program. **DiFronzo** is a program manager with Scientific Research Corporation and supports the JMECT Program.



tems engineers in the DoD acquisition community may be unaware of JMetc, and that lack of awareness results in a lost opportunity because well-planned and well-executed distributed testing can significantly reduce program risk and increase operational effectiveness. This article will provide program managers and systems engineers with an introduction to the advantages of distributed test and the benefits JMetc can provide to their program.

Why Distributed Test?

Program managers should consider conducting a distributed test based on three principal advantages:

- The ability to reduce overall programmatic interoperability risk.



JMETC is the DoD corporate program that provides the necessary test infrastructure to conduct joint distributed events by cost-effectively integrating live, virtual, and constructive test resources to support a program's needs for assessments and tests.

the Navy's E-2 Hawkeye, and the Joint Surveillance and Targeting System. They may also need to be tested with other weapons systems with which they will interact, such as the Marine's F-18, the Air Force's F-16, or the Army's Advanced Field Artillery Tactical Data System Joint Fires system. All of those C4ISR and weapons systems have test-quality hardware-in-the-loop simulators with current software available for testing through distributed means.

Not only is it smart to assess interoperability early in the developmental cycle to reduce program risk, it is also required by DoD Instruction 5000.02, which states, "During DT&E [developmental test and evaluation], the materiel developer shall assess technical progress and maturity against critical technical parameters, to include interoperability, documented in the TEMP [test and evaluation master plan].” Additionally, DoD Instruction 5000.02 states, "All DoD Major Defense Acquisition programs, programs on the OSD T&E Oversight list, post-acquisition (legacy) systems, and all programs and systems that must interoperate are subject to interoperability evaluations throughout their life cycles to validate their ability to support mission accomplishment.” That policy indicates DoD senior leadership is serious about joint interoperability.

- The ability to identify deficiencies early on, and finding and fixing problems early in the program life cycle will have much less impact on cost and schedule than deficiencies identified in initial operational test and evaluation (IOT&E).
- The ability to efficiently assess and test the system in its joint context early on, with the potential for early assessment from operational testers.

Testing is an expensive endeavor; and testing in a systems-of-systems environment is inherently more expensive because of the requirement to bring multiple systems together to verify data link interoperability and create a realistic environment that provides friendly command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems as well as threat capabilities. Many of our major weapons systems and systems in development have high-fidelity hardware-in-the-loop systems that use actual integrated hardware and software in a lab environment and accurately replicate weapons system performance, simulating a weapons system into behaving as though it is receiving real-world inputs and outputs. Integration of hardware-in-the-loop systems throughout the continental United States and overseas across a wide area network in realistic mission environments offsets the significant cost and coordination burden associated with bringing the systems together physically.

When conducting interoperability testing, an unmanned aerial system may need to work with Marine and Army tactical units on the ground as well as other airborne systems such as the Air Force's Airborne Warning and Control Systems,

Looking beyond basic interoperability, once a system's hardware-in-the-loop capabilities are integrated for distributed test, those same systems can be linked together to address specific mission threads, such as intelligence, surveillance, and reconnaissance support to troops in contact in an urban setting, time-sensitive targeting using simulated weapons, or ground convoy overhead escort. Again, DoD Instruction 5000.02 provides common sense guidance: "Systems that provide capabilities for joint missions shall be tested in the expected joint operational environment.” Distributed testing can allow operational testers to execute early assessments of those mission threads during the developmental test phase, providing feedback to the program for suggested changes that may be implemented prior to IOT&E. Alternatively, where systems are performing well early on, the operational test community, armed with previous early exposure, enters IOT&E with a higher level of confidence in the program's capabilities and limitations and can tailor IOT&E appropriately, in some cases potentially saving program dollars.

As programs transition to IOT&E, the focus should shift to live operations; and distributed testing's role at this point may shift to augmentation, which can help overcome impediments during live operations. For example, in testing future unmanned aircraft systems, many will have a requirement to integrate with JSTARS, which tracks surface targets over a wide area and can provide the unmanned aircraft systems operator with increased situational awareness. JSTARS deployment, however, is costly in terms of identifying unmanned aircraft systems test sites, and limited state-side availability will preclude live JSTARS test support in many

cases. Alternatively, the JSTARS high-fidelity hardware-in-the-loop capability is persistently on the JMECTC network, providing higher availability and much lower cost than live JSTARS in support of joint and unmanned aircraft system testing. There are several impediments to meeting the DoD Instruction 5000.02 mandate that systems be tested in their expected joint operational environment. The first is that many systems operating in such an environment are low-density/high-demand assets that may not be available at all or for the required amount of time for realistic testing. The second issue is that even if all assets are available, the cost associated with deploying multiple assets, maintenance support, and spares can be significant. Therefore, augmenting the system under test with high-fidelity virtual and constructive systems can enable one to create the realistic joint environment needed to properly test the system. Moreover, prior to live testing, virtual and constructive systems can be used to rehearse and refine the live test plan.

Improving Test Infrastructure

JMECTC is the DoD corporate program that provides the necessary test infrastructure to conduct joint distributed events by cost-effectively integrating live, virtual, and constructive test resources to support a program's needs for assessments and tests. JMECTC consists of a core reconfigurable infrastructure with associated products and customer support that enables the rapid integration of live, virtual, and constructive resources to link systems and facilities needed for a joint testing environment. JMECTC is currently integrated with 40 test and hardware-in-the-loop sites, with planned expansion to approximately 60 sites over the 2010-11 timeframe. The network is optimized for test with very high throughput, low latency, and negligible data loss. The network has a common networking protocol and middleware optimized for test that is compatible through gateways with legacy simulations and facilities. It also has an associated collection of high-performance, primarily government off-the-shelf software applications—known as JMECTC Tools—that help JMECTC improve test planning, management, and analysis capabilities while ensuring required network performance is maintained. JMECTC Tools also include the command, control, and communications assessment tools that aid in assessing interoperability—the same tools used by the joint community to assess interoperability for certification. The JMECTC Web portal provides information on distributed test procedures, upcoming test events, tool and software access, site status, lessons learned, and help desk contacts. Finally, JMECTC provides an expert team that will assist in planning and supporting distributed test events. That expert team brings procedures, methodologies, and solutions that have already been tested, proven, and put into practice.

The principal mechanism for direction of the JMECTC program is the quarterly JMECTC users group meetings. The JMECTC program relies heavily on the collaboration of the Services, U.S. Joint Forces Command, and other test and evaluation agencies to build an infrastructure relevant to

current and future requirements. In order to facilitate and formalize this exchange process, the JMECTC Program Office instituted the JMECTC users group. The group is composed of representatives from acquisition program offices, technical experts, labs, test facilities, and ranges that use or will potentially use JMECTC infrastructure and products. Its focus is on technical requirements and solutions. The users group makes recommendations to resolve JMECTC technical issues and improve integration capabilities, to include connectivity and modernization issues, middleware and object model requirements, and change coordination. The users group meetings are scheduled quarterly and dates are posted on the JMECTC Web portal at <<https://www.jmectc.org>>. First-time users will have to register on the portal, with approval normally taking several hours at most. Program managers should have appropriate representatives begin attending JMECTC users group meetings as soon as they see the potential need to conduct distributed test and evaluation as part of their programs.

Distributed Test Examples

There are several programs and test and technology initiatives that have leveraged distributed testing and the JMECTC program. One of the best examples is the Joint Surface Warfare Joint Capability Technology Demonstration. JSuW focuses on leveraging traditional intelligence, surveillance, and reconnaissance assets to provide long-range guidance to net-enabled weapons in high-threat littoral environments, posing new challenges and requirements for data-link functionality and concepts of operations. During JSuW's February 2009 SIMEX [simulation exercise] event, JMECTC partnered with the Defense Information Systems Agency to connect three separate sites for one week of focused events to simulate the littoral warfighting environment, with virtual F-18s in the Boeing Center for Integrated Defense Simulation in St. Louis, Mo., constructive P-3s in the MITRE Naval C4ISR Experimentation Laboratory in McLean, Va., and the Virtual JSTARS at Northrop Grumman in Melbourne, Fla. The exercise, which included hundreds of tactical engagements, enabled the JSuW team to validate their more mature data link message sets associated with net-enabled weapons and evolve their concept of operations.

According to Bobby Cornelius, the U.S. Navy lead and JSuW JCTD program manager, "Because of the dedication and expertise of the JMECTC team, the simulated exercise stayed up and was stable all week, allowing us to execute all desired scenarios." The JSuW team will continue to use distributed testing to assess the full suite of net-enabled weapons-related data-link messages that provide control and guidance commands until the JSuW effort transitions to live-fly in this fiscal year.

Another example is the U.S. Air Force Global Cyberspace Integration Center, which conducts Joint Expeditionary Force Experiments (JEFXs) for concept development, ad-

vanced technology initiatives, and early acquisition testing of net-centric capabilities. JEFX initiatives include net-enabled weapons and network interoperability focusing on airborne networking integration. The experimentation program enables early informal operational assessments by the test agencies that will use the same processes, procedures, and tools used in JEFX later in program of record formal testing. JEFX has a 10-year history of aggressively using distributed live, virtual, and constructive operations and, in fiscal year 2009, determined that JMetc was the optimal path to provide the required tools, connectivity, and on-demand network infrastructure for JEFX's continuous experimentation requirements. By leveraging JMetc, the Global Cyberspace Integration Center has saved an estimated \$4 million in fiscal year 2009. The savings were predominantly manpower related, achieved by outsourcing expanding connectivity requirements to JMetc and by transitioning from the extensive coordination (and manpower) involved with temporary networks to the streamlined coordination associated with a persistent network.

The Army has also done extensive distributed infrastructure testing using JMetc to prepare for Future Combat Systems testing and the follow-on Brigade Combat Team modernization. For example, the Army's 2008 Joint Battlespace Dynamic Deconfliction Event was designed to investigate and verify test methodologies to assess near-real-time joint airspace command and control processes during Joint Close Air Support and Joint Fires operations, including assessment of airspace deconfliction. Eighteen separate sites were integrated for the event. Joint Battlespace Dynamic Deconfliction was supported by several partner Service and joint initiatives from the U.S. Army, U.S. Air Force, U.S. Navy, U.S. Joint Forces Command, and the Office of Secretary of Defense; and it will provide a framework for future Army and joint modernization testing.

Use of JMetc is steadily growing. JEFX initiatives in 2010 will include B-2 Bomber link-16 integration testing and assessment of new close air support capabilities. Other fiscal year 2010 testing includes the Navy's Broad Area

Maritime Surveillance unmanned aerial vehicle and the Air Force's Battlefield Airborne Communications Network, a U.S. Central Command joint urgent operational need program.

Is Distributed Test on Your Horizon?

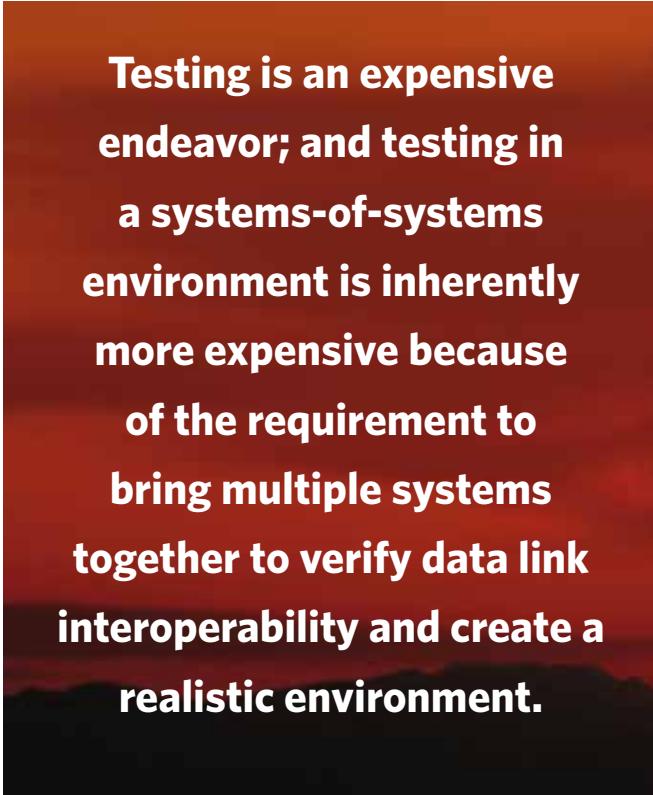
If you are considering distributed testing, or are already committed to distributed testing but want to explore options with JMetc, contact the JMetc Program Management Office. Any inquiries can be made by sending an e-mail to JMetc-feedback@jmetc.org, and you will receive a response within two business days. Other points of contact are available from the JMetc Web portal under the "Questions, Comments, and Suggestions" section.

JMetc team members will work with your program office and integrated test team to determine options, requirements, and resources needed to execute optimal distributed testing. For more significant efforts, JMetc members are well-positioned to become one of your program's teammates, participating in test working groups and assisting in writing the test and evaluation strategy and test and evaluation master plan. The costs to use JMetc will vary. For small test events, there may be no cost. Please note that

JMetc institutional funding, combined with the ability to leverage existing infrastructure and software tools, makes the cost of teaming with JMetc significantly less than establishing a program-specific network. Finally, JMetc team members encourage potential customers to attend the JMetc users group to share requirements and collaborate with other distributed test users.

For more information on JMetc, please go to the JMetc Web portal at <<https://www.jmetc.org>>. The portal will provide specific dates on the June/July 2010 JMetc users group meeting.

The authors welcome comments and questions and can be contacted at chip.ferguson@osd.mil and vincent.difronzo ctr@osd.mil.



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The Pulse of Performance

Vehicle Unit Cost Reports

Ray Davidson

If a cumulative earned value chart represents the health of a program, the vehicle unit cost report is the program's pulse.

The assault amphibious vehicle's earned value management effort has demonstrated a proven methodology for cost and schedule performance tracking. Cumulative earned value charts with stratification of the actual cost of work performed and its related performance metric plotted against the budgeted cost

Davidson is a program analyst for the Marine Corps Logistics Command in Albany, Ga. He served with the 6th Special Forces Group in the Army. Among other writing endeavors, he is a contributing author to regional and national publications, writes two syndicated newspaper columns, and has signed several book contracts.

of work scheduled provide, at a glance, an acuity reference of the project's health. Addition of program metrics such as the cost and schedule indices coupled with threshold variances combine to establish a forecasted/recommended estimate to complete. But when it comes to "auribus tenere lupum" [hold the wolf by the ears] the structure and data integrity enforced by the vehicle unit costs report is the analyst's choice.

The vehicle cost report and its sister, the vehicle exit unit cost report, enforce a structural, performance, cost, and financial discipline that have proved to be invaluable during the reliability, availability, maintainability/rebuild to standards, and the current inspect and repair only as necessary process.

Enforcing the Structure

Fundamental to performance measurement is the work-breakdown structure (WBS). Thus, it is imperative that a product-oriented family-tree division of hardware, services, and other depot work tasks is succinctly organized to display and define the vehicle/product to be rebuilt and relate the elements of the work to be accomplished to each other and the end product. In addition, to be able to identify anomalies and forecast future performance constraints, the WBS must be reconciled to its lowest unit. For analytical purposes, that is usually at level three and/or four of the WBS.

The WBS provides a formal product-oriented structure, or framework, that identifies all authorized project work. This formalization simplifies the problems of summarizing project-oriented data through both external and internal management reporting, and establishes the reporting structure (as explained in the Marine Corps Logistics Base's *Earned Value Management Systems Description and Procedures*, September 2002). This structure is the framework for reporting of labor costs, labor hours, material costs, program-level

costs and vendor/contractor support as shown in the table below.

MIL Handbook 881 states: "The Program WBS provides a framework for specifying program objectives. It defines the program in terms of hierarchically related, product-oriented elements and includes 'other Government' elements (i.e., Program Office Operations, Manpower, Government Furnished Equipment (GFE), Government Testing). Each element provides logical summary levels for assessing technical accomplishments, supporting the required event-based technical reviews, and for measuring cost and schedule performance."

The Accounting Method

The actual cost is used (versus the billed cost of labor) and is the actual labor rate for each employee charging time. The difference between the planned labor rate and the actual labor rate is the true variance we seek. Consequently, the difference between the planned price and the actual price of a material item is the basis of material variances and performance.

A challenge for the Department of Defense has been production expense and general and administrative expense (G&A). Those expenses are allocated to job orders through the use of production and G&A rates. The rates are budgeted and applied to all direct job orders based upon the direct labor hours charged and the cost work center. The production rate is applied to direct labor hours performed in productive cost centers only. The G&A rate is applied to all direct labor hours performed. Those rates are not to be confused with the stabilized billing rates used to price the sale of services. The applied rates are developed by the maintenance centers based on estimated costs within the annual budget and are used for control purposes. The applied rates should periodically be reviewed to see if they should be revised as a result

Figure 1. Vehicle Unit Cost Report

| WBS | Vehicle 1 | Vehicle 2 | Vehicle 3 | Vehicle 4 | Vehicle 5 | Vehicle 6 | Estimate | Average | Variance |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------|----------------|
| AAVR7 | | 3,480 | 562 | 36 | | 1,882 | 0 | 993 | -993 |
| Vehicle | | | | | | | 0 | 0 | 0 |
| Hull/Frame | 39,403 | 36,147 | 45,451 | 35,403 | 42,389 | 38,731 | 32,540 | 39,587 | -7,047 |
| Suspn/Steering | 16,007 | 19,163 | 10,999 | 11,762 | 19,023 | 15,723 | 25,432 | 15,446 | 9,986 |
| Power Package | 48,044 | 59,973 | 71,106 | 44,636 | 63,134 | 47,789 | 82,720 | 55,780 | 26,940 |
| AuxAutomotive | 46,237 | 42,907 | 56,561 | 45,763 | 40,319 | 30,288 | 53,090 | 43,679 | 9,411 |
| Navigation | 3,909 | 4,531 | 4,697 | 5,401 | 3,191 | 5,959 | 6,923 | 4,615 | 2,308 |
| Dissassembly | 18,079 | 19,179 | 18,385 | 42,627 | 20,233 | 14,610 | 17,806 | 22,185 | -4,379 |
| Assembly | 88,554 | 95,319 | 102,247 | 88,437 | 93,300 | 99,322 | 63,479 | 94,530 | -31,051 |
| Test | 486 | 221 | 198 | | 249 | 9 | 10,018 | 194 | 9,825 |
| Program Costs | 87,157 | 87,157 | 87,157 | 87,157 | 87,157 | 87,157 | 50,692 | 87,157 | -36,465 |
| Vehicle Cost | 260,719 | 280,920 | 310,205 | 274,065 | 281,837 | 254,313 | 292,008 | 277,010 | 14,998 |
| Total Costs | 347,876 | 368,077 | 397,362 | 361,222 | 368,994 | 341,470 | 342,700 | 364,167 | -21,467 |

Cumulative earned value charts with stratification of the actual cost of work performed and its related performance metric plotted against the budgeted cost of work scheduled provide, at a glance, an acuity reference of the project's health.

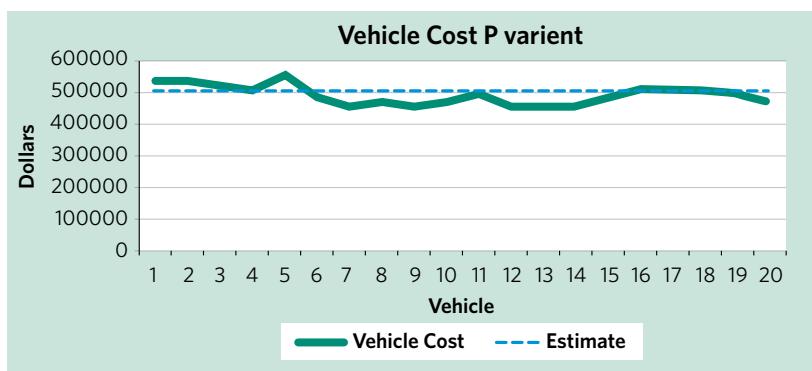
of actual results or revised forecasts, according to the "5.0 Accounting" section in the *Earned Value Management Systems Description and Procedures* referenced earlier.

The Importance of Analysis

The vehicle unit cost report tracks the cost of each individual vehicle as well as hours expended, material consumed, and program-level costs, (i.e., labor, material costs, and hours). Performance and variance analysis are available from both WBS and cost work center (CWC) views. The data can, therefore, be used to review cost and estimate at completion (EAC) variances in order to:

- Identify and isolate vehicle-, WBS-, and CWC-level problems causing unfavorable cost performance
- Evaluate the impact of process changes, variances, work-arounds, etc.
- Evaluate the performance of performing CWC
- Identify potential vehicle overruns and underruns as early as possible.

Figure 2. Vehicle Unit Cost Chart



Short of re-estimating the remaining work, computing the cost performance index and percent of trend, a projected estimate to complete (ETC) can be made as well as a final average vehicle cost. These numbers are usually triangulated:

- Sunk vehicle cost + cost performance index (CPI) x budgeted cost to complete + percent of trend (to give the most pessimistic cost)
- Sunk vehicle cost + CPI x budgeted cost to complete (this flatlines the performance)
- Sunk vehicle cost + CPI x budgeted cost to complete - percent of trend (to give the most optimistic cost).

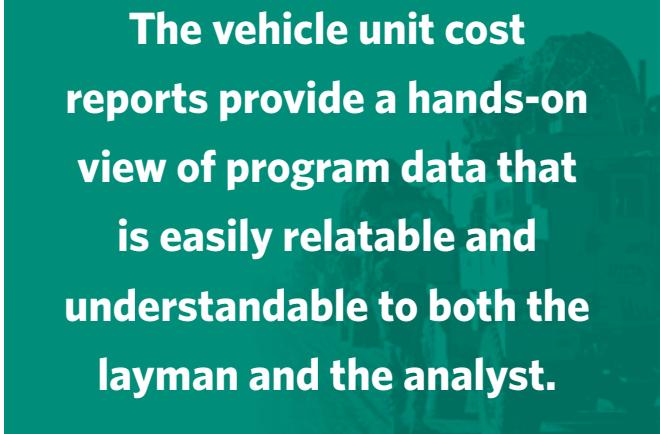
Those methods should always be balanced by the analyst's and program manager's assessment. That will conceivably provide a fourth ETC, but to use that projected estimate, there must be a sufficient degree of confidence in the analyst's judgment (usually based on history and past performance) and the program manager's ability to effect change either in shop floor processes or business flows.

According to Ruthanne Schulte in "What is the Health of My Project?" (*Project Management Professional*, April 2002), statistical forecasts (forecasts that are created using such indices as the cost performance index) can give early warning signs of project overruns and can be used to evaluate the accuracy of a manually entered estimate at complete.

David S. Christensen, Defense Acquisition University professor of accounting, expanded on this by saying, "Results show that the average EAC based on the cumulative CPI was the lower end of the average cost at completion. Other common index-based EACs that are found to be higher are more accurate. In particular, studies show EACs based on both the CPI and the schedule performance index (SPI) tend to be significantly higher and are generally more accurate" (quoted from Christiansen's e-mail to the author).

The ability of the program manager to effect process change and defy trend was seen at the Maintenance Center Barstow (MCB), Calif., when a holistic risk mitigation approach was used. MCB defined the entire business process as a potential risk, and methodologically reviewed all work for efficiency and effectiveness. That robust risk approach, coupled with support from Marine Corps Logistics Command's Maintenance Management Center's Assault Amphibious Vehicle Team and Lean Six Sigma efforts, exceeded both the analysts' and program managers' optimistic forecasts. At the same time, the risk management approach gave them the ability to use the vehicle unit cost tool to measure and analyze their processes, allowing them to improve, then exercise control over their work.

These results are amazing given that, according to Schulte, "The Department of Defense's experience in more than 400 programs since



The vehicle unit cost reports provide a hands-on view of program data that is easily relatable and understandable to both the layman and the analyst.

1977 indicates that without exception the cumulative cost performance index (CPI) does not significantly improve during the period between the 15% and the 85% of contract performance; in fact, it tends to decline."

The Vehicle Unit Cost Report versus the Vehicle Exit Unit Cost Report

As seen in the chart on page 46, the vehicle unit cost report tracks the vehicle costs associated with the job order number assigned to the vehicle as it was inducted into the maintenance cycle. Early in the Assault Amphibious Vehicle program, SYSCOM Program and Resources requested that Albany Marine Corps Logistics Base produce the exit cost of a vehicle versus the cost associated with the inducted vehicle. Since all costs were associated with the inducted vehicle, a concept was devised that approximated the cost of the final product. The plan was to track the cost of the hull and all serialized parts (hatch door, plenum, etc.) as direct charges; average the costs of components not succinctly tracked; and allocate the program-level costs. SYSCOM approved that method. Critical to the method was the capturing of all costs at level three of the WBS.

Assessing the Risks

For the vehicle unit cost report to be a viable program document to access costs as well as to provide prognostic value, the data supporting the report must be reconcilable to the third level of the WBS. That can sometimes be a challenge—when the program has un-reconciled costs or data integrity issues, for example. Such a situation does not allow analysis of vehicle unit cost at the component level.

Equally devastating for analysis is the failure to maintain the WBS structure. That was borne out at MCB with the fiscal year 2006 line. The decision to combine WBS elements for disassembly, assembly, and test created too large a "bucket" to drill down to negate cost drivers. Once the elements were broken out again, the major cost drivers were apparent.

Another risk is the costs captured at the program level, which can be viewed in two dimensions.

Program-Level WBS/Job Order Number Not Used

This situation is found when program-level costs are charged to an individual vehicle/product, driving the specific unit cost way beyond average or threshold levels. For example, the cost for Marine Corps Albany's OSMOSIS water purification unit jumped almost \$600,000 for one specific unit because there were no job order numbers established for program-level charges and the costs were applied to a single unit.

Unconstrained Line Side Stock (LSS) Costs

This is the case when repairable parts are charged to LSS versus the discrete WBS element. LSS was established for common nuts-and-bolts items—items usually considered pre-expended bin items with a unit cost of less than \$500. Occasionally, repairable parts find their way into LSS charges; they must be identified and charged to the correct component WBS element.

The management of applied rates and the frequency of change constitute a minor risk to the program but can be mollified by more frequent rate changes (weekly instead of monthly or quarterly). As stated earlier, the applied rates should be reviewed periodically to see if they should be revised in light of actual results or revised forecasts. As long as they are consistently applied, they do not pose a great risk to performance metrics, but they will pose a manual risk to the vehicle unit cost.

Bottom-Line Value

The vehicle unit cost reports provide a hands-on view of program data that is easily relatable and understandable to both the layman and the analyst. It is a fundamental view of the data that supports cost, schedule, and performance reporting and serves as the analysts hip-pocket guide. Without it, we could not have accomplished the drill downs at MCB as quickly and efficiently as we did.

Performance analysis using such methods as earned value indices, process control charting, run charts, histograms, vehicle cost reports, and other analytical techniques will provide a statistical and empirical foundation for our future management decisions.

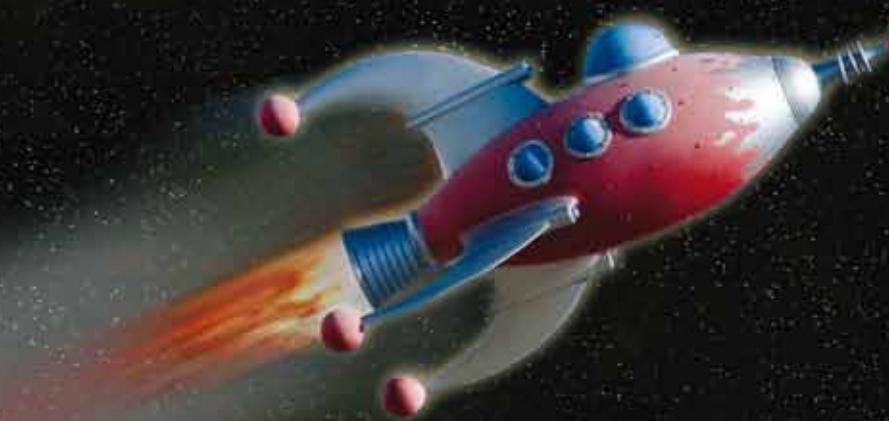
Cumulative cost and performance charts and their indices will contribute significantly to the health of our projects. At the same time, the vehicle unit cost reports provide the pulse; if properly used and supported by reliable data, they will enable us to keep our programs off life support, thus proving to be a valuable partner to gain desired outcomes. Our goal must always be to gain efficiency and effectiveness, to monitor our success, and provide the best equipment for the best price to our soldiers of the sea.

The author welcomes comments and questions and can be contacted at ray.davidson@usmc.mil.

Faster, Better, Cheaper Revisited

Program Management Lessons from NASA

Lt. Col. Dan Ward, USAF



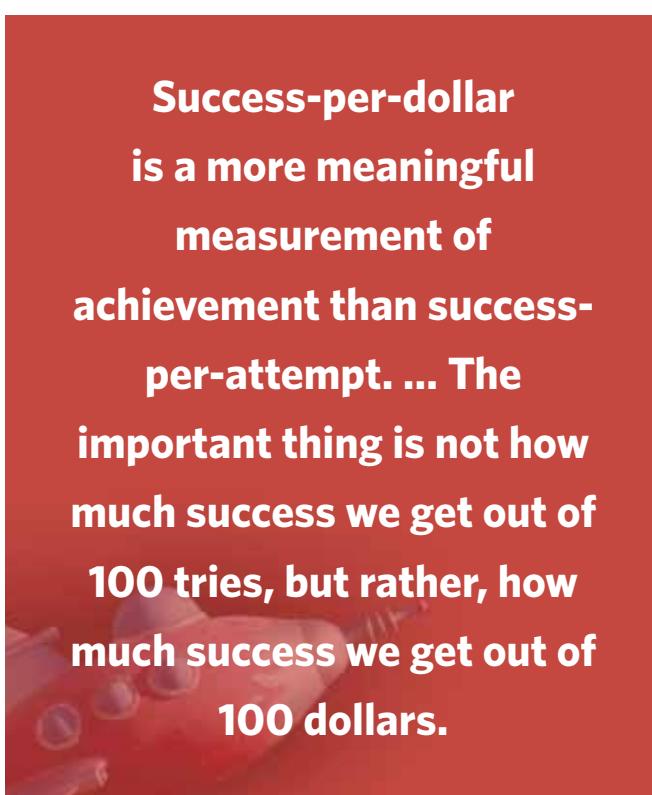
In 1992, NASA administrator Daniel Goldin began the agency's "Faster, Better, Cheaper" initiative. Over the next eight years, 16 missions were launched under the FBC banner, including the remarkable Mars Pathfinder mission. Today, however, many people look back at FBC with disparaging chuckles and wry remarks, as if it were an embarrass-

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ing failed experiment. Casual observers and serious students alike have apparently concluded that it's impossible for a high-tech project to be simultaneously faster, better, and cheaper ... and that it's foolish to even try. The popular consensus on FBC is often expressed in the supposedly self-evident saying: "Faster, better, cheaper—pick two."

It turns out popular consensus is wrong.



**Success-per-dollar
is a more meaningful
measurement of
achievement than success-
per-attempt. ... The
important thing is not how
much success we get out of
100 tries, but rather, how
much success we get out of
100 dollars.**

Looking Beyond Received Wisdom

A closer examination of NASA's FBC missions reveals an admirable record of success, along with helpful and illuminating lessons for anyone involved in developing and fielding high-tech systems. Far from an embarrassing failure or proof that program managers must "pick two," the FBC initiative actually improved cost, schedule, and performance all at once. NASA's experience provides an insightful organizational roadmap for sustaining mission success while respecting constraints of time and funding.

I should mention that NASA wasn't the only one to try FBC, but the agency flew the FBC banner prominently, long, and well. The fact that NASA's experience encompasses a complete portfolio of 16 missions, unencumbered by classification restrictions, makes it a particularly attractive and useful data set. Let's take a look, shall we?

According to Dr. Howard McCurdy's 2001 book *Faster, Better, Cheaper: Low-Cost Innovation in the US Space Program*, the 16 FBC projects (between 1992 and 1999) were "five missions to Mars, one mission to the moon, three space telescopes, two comet and asteroid rendezvous, four Earth-orbiting satellites, and one ion propulsion test vehicle." These were not simplistic backyard science projects. They were bold attempts at some of the hardest and most important unmanned missions NASA performs. The initial results were encouraging—nine out of the first 10 missions succeeded.

It is tempting (and would be fun) to spend all our time looking at a few of the FBC missions, such as the Near Earth Asteroid

Rendezvous (NEAR) project. NEAR launched in February of 1996 (a mere 27 months after it was funded) and cost \$122 million instead of the \$200 million originally estimated. Its two-billion-mile journey produced 10 times more data than expected. As its mission drew to a close, despite the fact that the spacecraft was not designed to be a lander, NEAR coasted to a successful landing on the asteroid Eros—the first time NASA ever attempted such a feat.

We could also consider the 1997 Pathfinder mission to Mars, which cost one fifteenth (6.7 percent) of what NASA spent on the Viking Mars mission 20 years earlier. Pathfinder was the first successful attempt to send a rover to another planet, and it produced over 17,000 images. Or we could look at Goddard's Small Explorer project, which delivered six low-cost, high-performance spacecraft in 10 years. ... You get the picture. The bottom line is that nine of the first 10 missions succeeded.

We could almost stop the assessment there. The events of these years show that when NASA tried to apply FBC to 10 cutting-edge missions, including things that had never been done before, their success rate was 90 percent. That alone is enough to prove FBC is possible, but unfortunately, it's not the whole story.

Depends on How You Do the Math and What You Mean by Failure

In 1999, four out of five FBC missions crashed and burned (sometimes literally). NASA ended up with a total of six failures out of 16 FBC missions—a success rate that was deemed unacceptably low. The party was over. Indeed, a report by retired Pathfinder project manager Tony Spear states that "the current Mission failure rate is too high," a sentiment echoed in several other studies and reports.

However, if the low success rate was a central reason for cancelling FBC, it seems someone made an unfortunate miscalculation. While it is true that 10 out of 16 is 63 percent, that number is not an accurate measure of what FBC accomplished. There is much more to the story than NASA's batting average.

We've already seen that Pathfinder cost one-fifteenth of the traditionally managed Viking. Dig a little deeper and we find the pattern of remarkably low-cost programs continues. In fact, all 16 FBC projects cost less than the Cassini mission to Saturn. This means FBC delivered 10 successful missions (plus six unsuccessful ones) for less than the price of one traditional mission.

I would like to respectfully suggest that success-per-dollar is a more meaningful measurement of achievement than success-per-attempt because there is no limit to the number of attempts we can make. The only real constraint on our activity is the amount of time and money we can spend. In other words, the important thing is not how much success we get out of 100 tries, but rather, how much success we get out of 100 dollars.

Imagine with me for a moment: If a magic space genie offered to give you 10 successful programs for the price of one, would you really care that he threw in 6 failed programs too? It's still a pretty good deal. For that matter, if he only offered to give you two successful programs for the price of one, it's probably an offer you should seriously consider.

Now imagine if this magic space genie added 10,000 failed programs to those 10 successes without increasing the overall bill. Sure, that's a lot of failure and would be difficult to accept, psychologically and politically. But financially, it would still be worthwhile, wouldn't it? If we can deliver a significant number of meaningful successes within our cost constraints, who cares how many failures we also deliver?

Speaking of failure, let's take a closer look at the missions that didn't work out. Spear's report states: "Most failures... can be attributed to poor communication and mistakes in engineering and management." Such failures are arguably avoidable, but they are neither unique nor ubiquitous to the FBC method. We can easily find examples of cripplingly poor communication and epic engineering mistakes in traditional projects as well as examples of FBC projects where communications were good and mistakes were rare. Those failure modes are valid criticisms of individual programs, but not of the FBC method as a whole.

The fact that FBC's failures clustered in 1999 should also give us pause. If the method itself was intrinsically flawed, wouldn't we expect the failures to be evenly distributed? The events of 1999 suggest other explanations: Perhaps people got burned out, sloppy or overconfident; perhaps the initial successes attracted people who did not sufficiently understand FBC; or maybe NASA pushed the envelope too far, over-correcting an initial success rate that was perhaps too high. Maybe there's another explanation entirely, but the least likely explanation is that FBC project leaders should have "picked two."

One more observation: assessments of the failed FBC missions often identify complexity as a root cause. McCurdy points out that FBC went badly when project leaders "reduced cost and schedule faster than they lessened complexity." In contrast, successful programs not only operated within tight cost and schedule constraints, they also insisted on simplicity—technically and organizationally. This preference for simplicity was not an explicit component of FBC's banner, but was clearly a top priority for the people who led the successful projects.

The Burden of Proof

Moving on, alert readers no doubt noticed the FBC missions were all unmanned missions. It would be reasonable to ask whether the FBC approach could be applied to manned missions, where the tolerance for failure is lower and where the necessary technical complexity is higher. In the realm of manned missions, our magical space genie's offer of 10,000 failures is quite unattractive.

If we want to improve our outcomes, the history of military acquisition reform shows we cannot limit our changes to methods and processes, or rely solely on systems analysis and statutory reform.

And yet, the traditional, non-FBC approach does not exactly guarantee success, does it? Given the outcome of missions like Pathfinder and NEAR, is it not possible to imagine an approach to manned space flight that is faster, better, and cheaper than previous attempts? Perhaps we can't do it for one-fifteenth of the price (or maybe we could!), but even cutting the price in half would be a step in the right direction. To say that such a thing is impossible is to assume a serious burden of proof.

Speaking of proof, the main point I want to make with this article is that a high-tech program can be simultaneously faster, better, and cheaper; there is no intrinsic need to "pick two." Having demonstrated this to my own satisfaction, I must confess I chose the easiest kind of challenge. Those who say a thing is possible need provide only one example, and NASA generously provided us with 10. Those who say a thing cannot be done have a much harder task—they must prove a universal negative. To disprove FBC requires not merely establishing a universal negative, but a universal negative in the presence of 10 positives. Even in the case of manned missions, I find little support for the idea that faster, better, and cheaper is impossible.

The next logical question is how to do such a thing. This is a good question, and we once again look to NASA's experience. How did NASA manage to deliver 10 successful programs (and six failures) within such tight cost and schedule constraints? It appears the secret was to apply FBC principles to just about every aspect of the program, from engineering architectures to organizational behavior.

For example, NEAR engineers gave three-minute reports and used a simple 12-line schedule. Many so-called "good ideas" were rejected during the design phase because they would have increased the cost, schedule, or complexity of the project.

Alexander Laufer's book *Project Success Stories* quotes NEAR program manager Thomas Coughlin: "Had I incorporated even half of these good ideas, the spacecraft would never have been built. Only those changes that could be made with negligible or minimal disruption were even considered." Other FBC projects took a similarly restrained approach, limiting organizational, operational, and technical complexity as a means of minimizing expense and delay.

The bottom line? After studying the entire cohort of NASA's 16 FBC missions, McCurdy makes the following observation: "Engineers and other experts can reduce the cost of spaceflight and the time necessary to prepare missions for flight. Moreover, they can do so without significant loss of reliability. They can also do so with only modest reductions in spacecraft capability."

This willingness to make modest reductions in capability is a key aspect of FBC—and a key point of controversy. The tricky thing is that "better" is a notoriously subjective assessment. FBC leaders asserted, "A reduced capability does not mean the mission is automatically worse. A mission with one-half the capability will be 'better' if it performs that mission at one-tenth the price." This is a philosophical position, and one that no doubt led to many spirited debates between those who believe More Is Better and those who worship at the church of Less Is More. FBC was decidedly on the latter side.

For any who are tempted to argue that reduced capability does not equate to "better," I once again point to NEAR's remarkable landing on Eros. Had NASA designed it to be a lander, they would have spent more time and money to produce a more complex system with an increased design capability, but because complexity increases the number of possible failure modes, its operational reliability would likely have decreased. It turns out, the spacecraft's operational ability to land on an asteroid was demonstrated in the absence of such design additions, perhaps pointing to the superiority of systems with reduced capabilities.

After those 16 missions were completed and analyzed, what conclusions did NASA itself draw? Spear's report was emphatic: "Dan Goldin is right on with his FBC thrust." In a similar vein, a 2001 report by NASA's Inspector General Roberta Gross recommended that NASA "fully incorporate FBC into the strategic management process." This recommendation comes after acknowledging that "NASA has been using the FBC approach to manage projects since 1992," to which I would add the word "successfully." This does not constitute a rejection of FBC. It is clearly an endorsement. No evidence here of the necessity to "pick two."

The Lesson for DoD

Why did I tell you all this? Why write about NASA in a DoD magazine? It's because NASA's experience provides data that is highly relevant to the DoD's current efforts to

improve defense acquisitions. If we want to improve our outcomes, the history of military acquisition reform shows we cannot limit our changes to methods and processes, or rely solely on systems analysis and statutory reform. We need to go deeper and change how we think and what we value. That's exactly what NASA did. They created a cultural framework of principles, priorities, and values, which shaped their decision making and guided their organizational behavior.

As for DoD, as long as we equate complexity with sophistication, complexity is going to eat our lunch, reducing our systems' reliability and operational effectiveness. As long as we believe adding time and money makes the project better, we're going to have overruns and delays. And as long as we believe in "faster, better, cheaper—pick two," we are going to be stuck in a self-limiting mindset, and our outcomes will suffer.

As an alternative, we might consider the skunkworks-esque FIST value set, which says it is important and good to be fast, inexpensive, simple, and tiny [note: read more about FIST in the May/June 2006 issue of *Defense AT&L*]. FIST is not the same as FBC—note the absence of the highly subjective "Better" and the explicit emphasis on "Simple." But when the FIST values shape our decision making, we end up pursuing projects that look an awful lot like the early FBC missions: small teams of talented people, with short timelines and small budgets, using simple technology to develop and field world-class operational capabilities.

Implementing things like FIST or FBC requires an understanding that these approaches are not methods or processes, but rather something akin to a worldview. They are sociological and cultural—not procedural—approaches. FBC was never a checklist. It was a way of life. And that's why it worked as well as it did, for as long as it did.

When NASA's leaders said, "It's good and important to be faster, better and cheaper," they meant it, pursued it, and rewarded it ... and for a time, people believed it. FBC wasn't about superficial modifications to the way NASA worked; it was a radical reimaging of what was possible, a cultural shift away from the idea that budget overruns and schedule slips are inevitable. Most important, it was a redefinition of what was desirable.

The DoD could do worse than adopt an FBC-like approach to acquisition improvement. Whether it's FBC or FIST or another social framework, the most effective way to genuinely change acquisitions lies, not in additional oversight or improved procedural efficiencies, but in a cultural shift. This is perhaps the hardest type of challenge, but as NASA showed, it can be done.

The author welcomes comments and questions and can be contacted at daniel.ward@pentagon.af.mil.

Scope Creep Horror

It's Scarier Than Movie Monsters

Wayne Turk



For a program manager, there is something scarier than Halloween, the Blair Witch Project, Friday the 13th, or any other horror movie that you can think of. It's the monster on the other side of the wall waiting to devour resources and destroy the project schedule. It's ...

Scope creep!

Turk is an independent management consultant. A retired Air Force lieutenant colonel and defense contractor, and the author of Common Sense Project Management (ASQ Press, 2008), he is a frequent contributor to Defense AT&L.

One definition of scope creep is “the gradual expansion of project work without formal acceptance or acknowledgement of their associated costs, schedule impacts or other effects.” Another is “the process of adding work and requirements, little by little, until the final project no longer resembles the original one and the original cost estimates and schedule have become meaningless and unworkable.” It’s very scary, and it happens with projects every day.

Why Does Scope Creep Happen?

There are a number of reasons for scope creep, and the following are a few of the most common:

Poor initial requirements. Someone didn’t do a good job on writing the original requirements or objectives. Too often, requirements are poorly written. They may lack clarity or detail. They may be ambiguous, vague, or not understandable. They may be contradictory. The end users or potential customers may not have been involved. The requirements may not be organized and prioritized. Whatever the reason, a poor set of requirements or objectives can lead to disaster when changes or additions come along.

Unwillingness to say no to a client. The client is ultimately in charge in that he or she is footing the bill and is the person to whom the project is delivered. It may be your boss, it could be someone else in the company/organization, or it might be an outside customer. Too often, PMs are intimidated by the client and afraid to say “no,” or else they want to be seen as the good, can-do guy. Understandably, the program manager doesn’t want to antagonize the client, but that reticence can be a steppingstone to failure.

No formal review and approval process for changes. Changes are accepted willy-nilly because no board, panel, committee, or person has the responsibility of looking at the changes and measuring them against some kind of acceptance criteria. There must be process and acceptance criteria, and funding for the changes must be included in those criteria.

Allowing people who don't do the work to accept the changes. Too often it is someone other than the PM or project team who accepts the change and then passes it to the team. That is not the same as having a person or group to review and approve changes within a formal process, and it is very dangerous.

Ego. The project manager has inflated pride, ego, or confidence in himself and/or his team. He thinks that they can accomplish anything. The team might be able to make the change, but at what cost (financially or otherwise)?

Thinking that one little change won't matter. That one change can lead to or force another and another until the one little change has become a large change or even a series of large changes. Once scope creep has its foot in the door, it is difficult to halt.

Controlling the Scope Creep Monster

Scope creep can be the bane of a project’s success, if not its very existence—and unlike a movie vampire, you can’t keep it away with garlic or a wooden cross. It takes planning, determination, and good processes to defeat it.

Requirements

Let’s start with the project’s requirements or objectives (the term requirements will be used from this point to describe both). The first characteristic of a good requirement is that it is necessary. With today’s fiscal constraints, there is rarely any room for nice-to-have or frivolous requirements. The requirements must be accurate as to what the product needs to deliver. Requirements must be unambiguous. Multiple readers should come to the same understanding of what each means. If a requirement can be interpreted more than one way, you are in trouble because chances are that the developer or builder will interpret it the wrong way. Terms like “user-friendly,” “fast,” “easy,” “flexible,” “state-of-the-art,” “maximize,” “minimize,” or “efficient” all mean different things to different people, so avoid them like the plague. All requirements must be feasible, attainable, achievable, and expressed in quantified terms that mean the same thing to everyone.

Requirements must be prioritized. The priority is normally set by the end user or customer, but the PM may have a say—especially when the user sets the same priority on a number of requirements. Along with operational needs, other factors can influence priority. For example, cost can play a huge role. If meeting one requirement will cause the expenditure of 75 percent of the budget, it probably shouldn’t be the highest priority unless, of course, it is the primary requirement of the project. Technical risk and schedule impact are other influencing factors. They must be weighed and the users have to understand their effect on priorities.

All requirements must be quantifiable, measurable, and verifiable in some way. There are a number of ways to verify that a requirement has been met, among them inspection, analysis, demonstration, simulation, and testing. Just remember that every requirement must be verifiable in some way. It should be verified in the most expeditious and least expensive manner possible.

Verifiability is related to traceability. While especially critical in software development, in any project someone should be able to trace a requirement from identification through development to final verification. Requirements need to be written with the same terminology and the same standards throughout. It also helps for them to be organized and grouped into defined categories. That allows the team to find duplications, inconsistencies, and contradictions.

Finally, requirements must be results-oriented. The objective of the complete requirements package is to provide a



Arm yourself with good requirements, strength, determination, good processes, and planning, and you can defend against and even slay the scope creep monster that's threatening your project.

product that meets the users' needs and/or solves a problem. It doesn't necessarily have to look good, involve the latest technology, or do all kinds of extra things. It must provide the results and the product that is wanted.

Accepting or Declining

Project managers have to learn when to say no and when to say yes. When the client wants to change or add a requirement, the change or addition should be analyzed for resource, cost, and schedule impacts. There should be a standardized review and approval process. If there is an impact to the cost or schedule, the client must have the facts presented and then must formally (and preferably in writing) accept any change to the cost and schedule. That usually means adding more funding to the project, extending the schedule, and/or dropping other requirements to compensate for the change.

At times, a change or addition will need to be declined. It isn't always easy to say no, especially if the change is coming from a boss or a good customer. It requires strength and determination. If the answer needs to be no, it will also require an explanation. The project manager needs to get

the facts together as to why the change can't (or shouldn't) be accepted and present them logically and unemotionally. That is where the review process comes in. The analysis can determine what the negative impacts are and provide details and numbers as the basis for denial.

A project manager cannot let ego or fear get in the way of saying no. Even if the PM has a great team he thinks can do anything, they need the time, tools, and money to succeed. If a PM doesn't have the strength, willingness, and communication skills to stand up and say no and explain her decision, she should not be in the management position. That is a cruel thing to have to say, but it is the truth.

When There is No Choice

Yes, there will be times when the PM will be overruled by someone higher up the chain of command, logical arguments and facts notwithstanding. And someone else's decision to accept a change may not come with additional funding or schedule adjustment either. If that happens, there are a few things that can be done to minimize the schedule or cost impacts. (They are actually good guidelines for a project at any time.) This is certainly not an all-inclusive list, and the items are not in any order of priority, but it's a start:

- Leverage on previously developed work. If you can use something that someone else has already done or paid for, do it.
- Set a timeline or due date for all tasks. Have a tracking system for tasks, due dates, and action items. Review the tracking system frequently.
- Assign responsibility for each task to someone.
- Consolidate tasks for cost- and timesavings.
- Make tasks sequential only if they have to be.
- Use some form of earned value management.
- Track costs closely and compare them to planned costs.
- Project upcoming costs and revise them as changes occur.
- Don't use gold-plated requirements (those that are higher or more complex than actually needed).
- Use cost-benefit analyses to help make decisions.
- Don't waste resources on unnecessary work.
- Do things right the first time; rework is expensive.
- Prioritize requirements and tasks to identify what can be cut if something has to go.

You Can Slay the Dragon

Scope creep is that monster hiding under the bed, ready to sneak out and kill your project. Yes, it's scary, but arm yourself with good requirements, strength, determination, good processes, and planning, and you can defend against and even slay the scope creep monster that's threatening your project.

The author welcomes comments and questions and can be contacted at rwturk@aol.com.

Defense Acquisition Enterprise 2.0

Wiring the Pentagon with Web 2.0 to Transform the Acquisition Enterprise.

Peter Modigliani

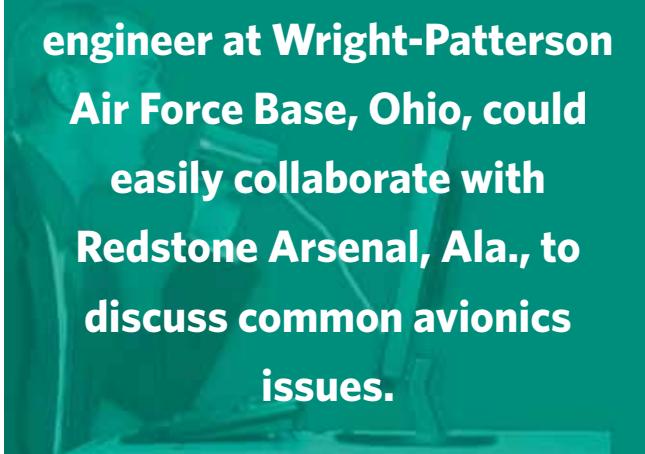


Forty years ago, the Department of Defense invented the ARPANET (Advanced Research Projects Agency NETwork), the precursor to the Internet, as a means to share information on defense research. DoD needs to once again harness the power of Internet technologies to develop and field the next generation of defense systems. Web 2.0 empowers users to collaborate, create resources, share information, and integrate capabilities in a distinctly different way from static Web sites. Integrating

Modigliani is an assistant vice president for program management at Alion supporting Air Force acquisition. He is a Project Management Professional and Level III certified in program management.



Web 2.0 technologies across the defense acquisition enterprise would provide rapid and agile collaboration and information sharing, and it would streamline many of DoD's traditional bureaucratic processes. The intelligence and operational communities have achieved great success over the last few years by collaborating using Web 2.0. The technologies can generate innovative methods to develop and field capabilities sooner by allowing those in the acquisition world to cut across functional stovepipes and better collaborate with the operational communities.



Using Web 2.0 tools, an engineer at Wright-Patterson Air Force Base, Ohio, could easily collaborate with Redstone Arsenal, Ala., to discuss common avionics issues.

Twitter™, Facebook, LinkedIn®, and YouTube have radically changed the social, media, and business worlds, and today's successful leaders are those who can best capitalize on those tools. If the acquisition community embraces them, the opportunity exists to transform the bureaucracy into a more agile, responsive, and knowledgeable enterprise. The following are some of the more prominent Web 2.0 concepts, services, and Web sites.

Microblogging

A messaging system with a 140-character message limit used to distribute time-sensitive information, solicit feedback, or track commentary on issues. Users follow people, organizations, or subjects. Twitter is, by far, the leader in this industry with 23 million visitors in August 2009 and over 5 billion tweets.

Blogs

Short for weblog. Provides an online diary of posts to share news, commentary, and feedback. Over 1 million daily blog posts integrate text, photos, videos, links to other Web sites, and a comment section for readers to contribute. There are more than 100 million blogs covering individuals, companies, news, politics, sports, art, etc. Corporations have embraced blogs to streamline product development and collaborate with customers. General Motors has a series of blogs from their design team to discuss the product lines with dealers and customers.

Wiki

A Web site that allows for easy creation and editing by multiple users, often used to enhance collaborative Web sites, personal note taking, corporate intranets, and knowledge management systems. Wikipedia is a massive online encyclopedia with 13 million articles written collaboratively by volunteers around the world and edited by anyone with access to the site.

Social Networks

Online communities of people who share interests or activities or who are interested in exploring the interests and activities of others. Facebook, MySpace™, and LinkedIn are the three most popular online social networks, with the first two being in the top five most visited Web sites in the United States. Corporations from Goldman-Sachs to IBM have embraced social networks for business.

Crowdsourcing

The act of taking a job traditionally performed by an employee and outsourcing it to an undefined, generally large group of people in the form of an open call. The health care industry has crowdsourced everything from pharmaceutical research and development to tracking H1N1 outbreaks. While you may have experts on your staff, tapping a larger, diverse community has repeatedly shown to be more successful in generating better results.

If DoD can introduce these powerful new collaborative technologies in a secure environment, the possibilities to streamline bureaucratic processes are endless. What follows are a few examples of how Web 2.0 can be incorporated in DoD acquisition processes.

Portfolio Management via Micro-Blogging

Leaders receive monthly or quarterly reports with stale data, whereas a DoD microblog can provide leadership a synopsis of all their programs' current status and issues on a single page. Program managers can post regular updates (in 140 characters or less) for external communication across the community. Portfolio managers can set up their account to follow all their programs and get a tailored digest in near-real time.

Microblogging is also valuable for news updates with links to the full story. Imagine reading along with the program updates the following stories: "Congress passes FY10 appropriations bill"; "SECDEF returns tanker selection authority to Air Force"; "USD(AT&L) issues new policy memo"; or "Brig. Gen. Smith announced as PEO C2". In a quick spin of your BlackBerry® dial, you can be current on all the issues in the time it takes for the speaker at your meeting to get to his next PowerPoint slide.

Program Community Blogs and Document Repositories

If 140 characters is too limiting, try the full blog format. Blogs provide a valuable communications management opportunity for the dozens or hundreds of stakeholders within a program's community: the program office, user community, testers, sustainers, and headquarters staffs. Instead of sending a limited audience e-mails that will be buried amongst the thousands of others to be read, blogs allow members to post similar information to a wider audience and, ideally, in a more structured environment. Posting information about

program test issues will inform both the test community and the engineers about potential rework, the production manager of potential schedule delays, and the financial team to track potential cost overruns. Posting all the program documents to a central repository online is another invaluable communication tool for the community. Sharing the latest program information across the functional areas, organizations, and locations ensures stakeholder engagement and early identification of issues and solutions.

Leadership Blogs

Milestone decision authorities, senior acquisition executives, and program executive officers could effectively communicate their visions and guidance by maintaining a blog. Posts can spotlight a program success story or highlight individuals for awards and promotions. If leaders give a presentation at a conference, post the slides and video online for the full community to see. Share that great briefing you just received with the enterprise by posting the link, slides, and contact information. Want to stress early systems engineering, independent cost estimates, or acquisition manpower? Blog about it, and your community can collaborate online. Bold leaders open to feedback can allow readers to comment on each blog post to ask questions, share lessons learned, or provide feedback on the issues.

Online Communities

LinkedIn is a networking tool often used to find connections to recommend job candidates, industry experts, and business partners. It allows registered users to maintain a list of contact details of people they know and trust in business. Instead of maintaining a list of people in the global address list or your Microsoft® Outlook contacts, a DoD online community could be far more effective. Create online communities for a particular organization, a weapon system, all major defense acquisition programs and major automated information system program managers, or all aircraft system engineers. Establish communities for each military and civilian career field to discuss targeted training, career development, and future opportunities. LinkedIn's value is not only having your connections' current contact information, but having access to the broader network of their connections and their connections' connections. As many of DoD's program offices are understaffed, tapping the broader network is an invaluable resource for users to gain knowledge beyond those assigned to the organization. Author James Surowiecki stressed in *The Wisdom of Crowds* how groups of people can form networks of trust online without a central system controlling their behavior or directly enforcing their compliance.

Decision Support Software

The defense acquisition system rivals the U.S. tax code in its complexity. Decision-support software like TurboTax® digests the complex tax code to guide taxpayers step by step through their tax returns. Imagine how related software could help program managers navigate the complex acquisition bureaucracy. The system could compile all the

Blogs provide a valuable communications management opportunity for the dozens or hundreds of stakeholders within a program's community.

acquisition guidance, policies, and statutes into a central application. The software's business logic will walk users through each section of the acquisition strategy and navigate the path based on user inputs. Say a program was developing a contract strategy and came to a page on contract type. The program may prompt the user, "What contract type are you envisioning?" and list each available contract type with additional information (pros and cons, typical uses, and recent guidance). The system may recommend an option based on program inputs or leadership guidance (e.g., use fixed-price contracts). Decision-support software would help program managers develop better acquisition strategies sooner, ensuring complete coverage and integration of the latest guidance.

Wiki Acquisition Decision Memorandums

How many major reviews have you attended where leaders made decisions, then for weeks following the meeting, the staffs debate comments, key decisions, and action items? Establishing a wiki for each review allows all meeting participants to contribute to, discuss, and review an acquisition decision memorandum online. Per established business rules, the milestone decision authority's staff will finalize and approve the memo within three to five business days of the review. Wikis have also proven valuable to use as agendas for large meetings like a program management review. Participants from multiple locations can evolve and track the agenda and post briefings and documents to the page so everyone can come prepared to the meeting. Users across multiple locations can collaborate online with wikis for quick items such as point papers and responses to congressional inquiries or for larger files such as a systems engineering plan or a test and evaluation management plan.

Crowdsourcing Requirements and Analysis of Alternatives

When DoD identifies a capability gap, a high-performance team is compiled to develop the requirements and often drive quickly to a common materiel solution. Imagine what

crowdsourcing could provide to the early stages of requirements definition, analysis of alternatives, and selection of a materiel solution to become a program. Instead of a small team of user and acquisition representatives, what if DoD crowdsourced the problem and tapped the entire defense community (operators, acquirers, engineers, and industry) for solutions. A sample process for crowdsourcing:

- Department identifies a capability gap
- Capability gap is published online
- Online crowd is asked to identify solutions
- Crowd submits materiel and non-materiel solutions
- Crowd vets solutions
- Operational and acquisition leaders approve material solution
- Recognize those who contributed to the winning solution
- Department has a better solution sooner.

By tapping an expansive network, the innovative approaches will be developed and expanded upon by others, making the final product a refined solution that by far outweighs what the highest performing team could come up with after being locked in a room for a few weeks. Users of existing systems, even in other Services and agencies, may identify a fielded system that could address the identified gap. Labs and the Defense Advanced Research Projects Agency can identify technologies in their development pipeline to apply to the solutions. Industry—particularly small businesses and those traditionally not in the defense arena—could recommend solutions including their own existing system or capability. In fact, Army Brig. Gen. H.R. McMaster, director of the Army Capabilities Integration Center's Concepts Development and Experimentation Directorate, demonstrated his support for crowdsourcing when he released the 2009 Army Capstone Concept online for public comment on how the Army plans for future armed conflict in 2016-2028.

Harness the Power of the Community

Imagine an acquisition policy blog in which new acquisition policy laws and DoD policies are published and debated. Leadership can gain valuable insight into the impacts and issues with the proposed policy changes. Draft policies and legislative language can be posted and receive ample feedback for decision makers prior to finalizing. For example, Congress, based on ample Office of the Secretary of Defense inputs, unanimously approved the Weapon System Acquisition Reform Act of 2009, yet thousands across DoD are now struggling to interpret and implement the new language. Surowiecki highlighted how the wisdom of crowds can help people learn much faster and more reliably, and be less subject to political forces than the deliberations of experts or expert committees. Posting approved legislation and policies fosters discussion of implementation and issues. Leadership and headquarters staffs listening to others by monitoring or joining conversations can be even more valuable than traditional means to distribute information or direction. As DoD continues to grow the acquisition workforce, the department needs knowledge workers who will embrace these collabora-

tive technologies and reshape the nature of defense acquisition work.

Tear Down Rigid Organizational Structures

Enterprise 2.0 allows DoD to think outside the boxes of the traditional organization chart with an agile, flexible distributed workforce to tackle the challenges of the day. While resources may continue to be dedicated to a single program or oversight organization, collaborating online allows a broader spectrum of expertise to develop a strategy or address an issue. An engineer at Wright-Patterson Air Force Base, Ohio, could easily collaborate with Redstone Arsenal, Ala., to discuss common avionics issues if both were members of a user group and shared information online. Functional managers could rethink their resource allocations. Instead of simply dedicating personnel to specific programs, they require a portion of their time collaborating with the wider community. Leaders will be those who are successful in supporting the online community instead of established titles and organization charts.

Challenges

Integrating Web 2.0 into DoD's business processes comes with some large challenges, which is why implementing it through small projects is preferred over a single, major DoD-wide program. Some challenges DoD faces are:

- Resistance to change
- Security concerns
- Integrating existing technologies
- Funding
- Leadership buy-in
- Difficulty measuring return on investment
- Managing the early phases
- Industry involvement
- Eliminating reports/reviews once new tools are online
- Avoiding information overload
- Discouraging negative consequences for sharing bad news.

Embracing Web 2.0

While the ideas outlined in this article come with a huge undertaking of resources, technology, and cultural shifts, successfully integrating Web 2.0 technologies into defense acquisitions could transform every area of program management and the enterprise as a whole. Leaders should empower their tech-savvy employees to design how to harness these new technologies into new possibilities and strategies to reshape defense acquisitions. Begin to experiment with various tools and demand more from your chief information officers to provide you access to Web 2.0 tools. Move beyond your static organizational Web site and embrace Web 2.0 to shed your bureaucrat label and become an innovative 21st century leader.

The author welcomes comments and questions and can be contacted at peter.modigliani@yahoo.com.

Buying Green As the largest federal buyer of goods and services, the Department of Defense strives to ensure that every procurement meets the requirements of all applicable federal green purchasing requirements. In fiscal year 2004, DoD established a formal Green Procurement Program (GPP) to enhance and sustain mission readiness while protecting the environment through compliant, cost-effective acquisition that reduces consumption of resources and excessive generation of solid and hazardous wastes.

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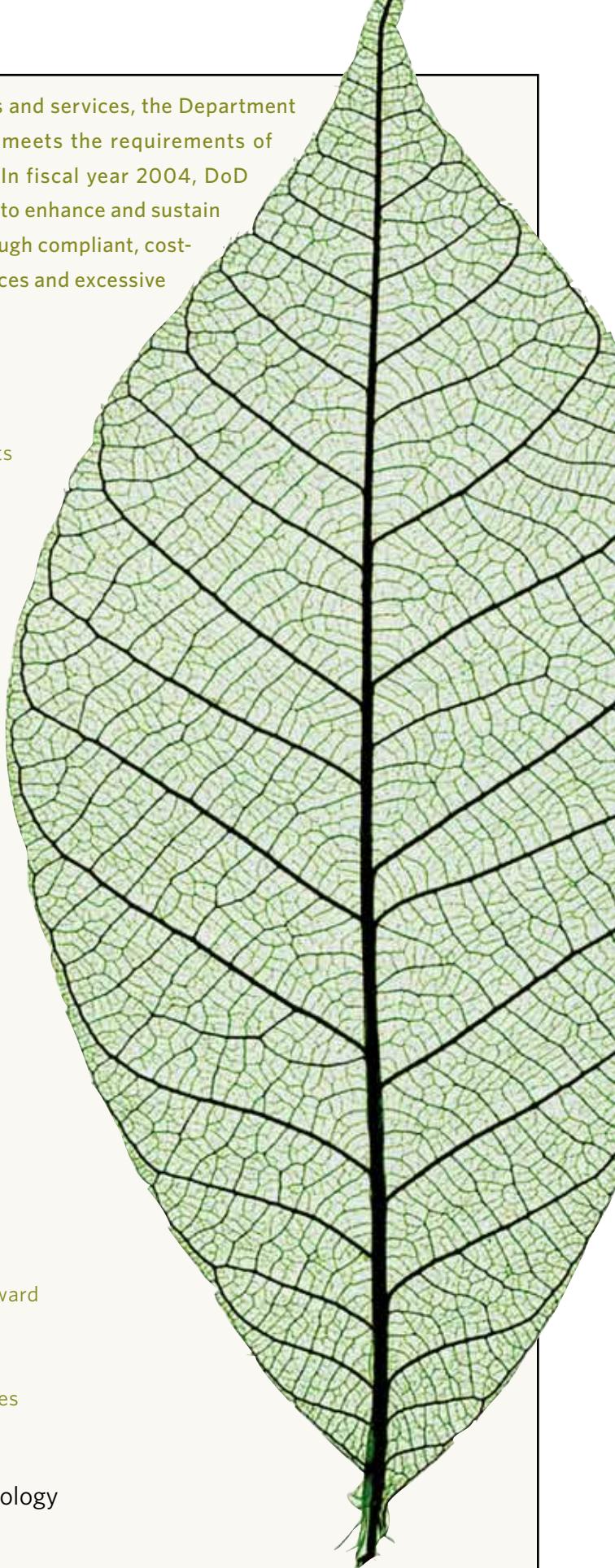
Green Procurement



The objectives defined in DoD's GPP policy are to:

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- ❖ Reduce the amount of solid waste generated
- ❖ Reduce consumption of energy and natural resources
- ❖ Expand markets for green products and services

For more information visit the Acquisition & Technology Web site at <www.acq.osd.mil/at>.



Savvy Program Management

Lt. Col. David R. King, USAF



A program manager's performance often equates to the ability to influence others in getting something done—namely, a program manager's political skill. While the word "politics" has a negative connotation, it is more productive to accept that politics exist and recognize that political skills are often required to get things done.

Not being aware of one's political environment can lead to failure from either being unaware of political agendas or overusing power—situations that can be equally ineffective. For example, intelligent and successful people can fail when an agenda item or stakeholder group they did not anticipate is unexpectedly revealed. Alternatively, not understanding a situation can lead people to use influence when it is not needed. As a result, a program manager's political skills can be more important than knowing what to do in a given situation.

King is an acquisition officer who earned his doctoral degree in strategic management from Indiana University. He has broad program manager experience, including serving in the AC-130, F-15, F-22, F-117, and MQ-1 Predator programs.

Because of negative connotations with politics and the use of power, political skills are not often openly recognized as important. As a result, program managers are left to learn politics through firsthand experience. That leads to MIT Professor of Public Policy and Organization Harvey M. Sapolksy's observation that some program managers are better at politics than others, as different program managers' political skills will be largely limited to what they have seen work. While what works in any given situation varies, there are some simple ideas program managers can use to build their political skills.

Appearance Matters

First, to be an effective program manager, you need to look and act the part in regard to demeanor, appearance, and product. Your demeanor as a program manager is important as it establishes expectations of what people can expect from you. Ultimately, you need to be consistent, and present yourself as someone who is dependable. When it comes to appearance, you should meet or exceed the dress standard for your organization. Things as simple as a good haircut or polished shoes send a message to others that you have the little things under control. With regards to completing a product, when you submit something, make it look professional or comply with the expected format or other conventions (i.e., complete it on time) to ensure you and your ideas are taken seriously, and to ensure they appear worthy of attention.

Know Your Capabilities

Before considering a problem and how to address it, a program manager needs a realistic assessment of his or her strengths and weaknesses. Your choices will be limited by your strengths and weaknesses or by what you can realistically accomplish. Trying something that is beyond your capabilities may be the quickest way to lower your political capital by making it easy for others to take pleasure in any resulting misfortune. Having a realistic self-assessment of what you can do makes others more likely to want to work with you as a program manager. Leveraging the complementary strengths of others can allow a program manager to expand upon available choices and work with others in a team. If you work to establish only a single personal strength, focus on being known for having integrity. While no amount of integrity can compensate for a lack of skill, a lack of integrity can quickly doom efforts by even the most skilled.

Develop a Shared Goal

Program management requires the cooperation of people outside of a program manager's direct chain of command to achieve goals and objectives. Even if they don't have direct control over everyone involved in the program, program managers still need to develop and communicate a common goal that can ensure people will work cooperatively. Ideally, the goal should be significant enough to justify additional work or willingness for personal sacrifice. When people are challenged to accomplish something, they are more likely to

fully employ their talents and have increased satisfaction. As a result, establishing formal goals offers the benefit of reducing potential conflict. All you have to do is bring people together with complementary skills and outline a worthy goal that enables them to accomplish more together than they could separately.

Establish and Share Success

A program manager's success likely parallels how successful he or she makes the people working on a program feel. Instead of seeking the limelight, program managers need to liberally spread recognition across the people and organizations that contribute to a program. In the words of former U.S. President Harry S. Truman, "It is amazing what you can accomplish if you do not care who gets the credit." Identify short-term milestones and celebrate each accomplishment on the way to a shared goal. Also, establish formal and informal ways to recognize accomplishments and contributions of others. Not everyone can or even wants to be an award winner, but most everyone appreciates receiving a handwritten note of thanks. Writing a note also helps to build a bond with the recipient, or it can help build your network.

Build and Leverage a Network

A network is a collection of personal relationships that a program manager can use to share information and get advice. Your network should be mutually beneficial to all parties in it. Used effectively, your network can extend the concept of teamwork beyond your project team to a larger community. A network is built over time and is composed of people a program manager interacts with from work, service, personal life, and other activities. While people generally prefer to work with people with similar thinking styles or people with whom they are familiar, diverse teams often have a larger network. As a result, program managers should work to build teams and networks with people who are ex

**"What distinguishes
programs in government is
not that some play politics
and others do not, but
rather, that some are better
at it than others."**
Harvey M. Sapolksy

A program manager's political skills can be more important than knowing what to do in a given situation.

perienced in as many areas as possible. Consistent with the adage "if we have the same opinion, one of us is expendable," program managers should avoid filling their project teams with people similar to them to avoid looking at problems and solutions from too narrow a perspective.

Know the Issues

As the program manager, your primary objective is to become the recognized expert and clearinghouse for information on your program. While no program manager will be effective without knowing his or her program and its associated issues, knowing the issues takes this a step further. A more effective program manager will stay ahead of the curve by anticipating issues through risk management and pushing information on how those risks are managed. That can be done by influencing what is on the agenda when a program is discussed or decisions need to be made.

Be proactive in identifying areas to focus upon, and then build plans with intermediate steps that demonstrate progress. If given the opportunity, help to define information that is used in analysis on your program, take part in the analysis, and be aware of and provide comparisons that put your program in a favorable position. For example, user testimonials can help legitimize the need and performance for a program because they come from the people who depend on how it performs. Controlling the information on your project can only be done if what you provide is accurate and you account for other positions. Again, integrity alone cannot save a project, but a lack of integrity can doom it.

Know the Environment

An unhappy stakeholder can undermine a project and undo a lot of progress a program manager has made toward reaching a shared goal. Assessing a project's environment can be done in three steps:

- Identify the interested groups or stakeholders. Be careful to avoid limiting your list to allies and opponents, as neutral parties may later become important in deciding an outcome.
- Identify stakeholder interests. It is difficult, but you need to think about each group's position and work to determine their goals or what drives them. Simply trying

to identify solutions to an issue without stepping back to see how it became an issue will result in success only with a bit of luck. Work to find what arguments will effectively influence stakeholders.

- Evaluate the relative influence of the groups. Identifying a solution will require capturing a majority of stakeholder concerns, or at least the ones with the greatest influence. It will also be important to consider that your opponents are trying to do the same.

Work Hard

Believing in something is part of what makes it happen. Treat failure as a success in identifying a way that does not work. If achieving something is important to you, then you should show others its importance by continually working hard to achieve it. Your hard work signals the importance of the task to the people working with you and to any potential opposition. Establishing a reputation for setting clear goals and working hard to achieve them establishes a level of commitment required if someone wants to do something different.

"It is amazing what you can accomplish if you do not care who gets the credit."

Former U.S. President

Harry S. Truman

Working hard also helps establish a reputation for getting things done, and that will make it easier to accomplish things in the future. One caveat to working hard is the need to avoid getting so focused on the goal that you ignore other ways to achieve it. Equifinality is a concept that recognizes an outcome can be achieved by many different means. By changing how to accomplish something, a program manager may find that more people are willing to work toward the same goal.

Ultimately, your reputation as a program manager will depend on what you accomplish. Improved awareness and development of political skills will likely help you accomplish more and put you in a position to be more effective on your current project at the same time it opens additional opportunities. I hope some of the ideas outlined here will help you and your program.

The author welcomes comments and questions and can be contacted at david.king2@wpafb.af.mil.

For more acquisition news, please go to the Defense AT&L magazine Web site at <<http://www.dau.mil/pubsheets/Pages/DefenseAtl.aspx>> and click the links under the "Acquisition News Topics" heading.

DAU Graduates its 1 Millionth Student

The Defense Acquisition University recognized its 1 millionth graduate in a ceremony held Nov. 20, 2009, at the Fort Belvoir campus. Wilfred Cruz-Camacho, team leader for the U.S. Munitions Team at the Armaments Research Development and Engineering Center, Picatinny, N.J., completed DAU's Program Management Tools (PMT 250) course, making him the 1 millionth graduate of a DAU certification course.

DAU President Frank Anderson presented Cruz-Camacho with a plaque commemorating the occasion, and DAU Alumni Association President Bill Bahnmaier welcomed Cruz-Camacho with a free one-year membership to the association. Martha Newman, chief, Career Program 16 Office, presented the graduate with a certificate of congratulations on behalf of the Army Career Program 16 for Engineers and Scientists (Non-Construction).

Anderson acknowledged the teamwork that makes such an accomplishment possible. The Service or DoD Director, Acquisition Career Management (DPCM) office works with DAU to ensure enough course offerings are planned each year, and the DPCM office coordinates the training requirements within its own workforce to send the right employees to the right courses at the right time. DAU must consistently provide the highest quality training and staff support to the student, and the student must be dedicated enough to fully participate, learn, and successfully complete the course.



Wilfred Cruz-Camacho, team leader for the U.S. Munitions Team at the Armaments Research Development and Engineering Center, Picatinny, N.J., and DAU's 1 millionth graduate. DAU photo

New Defense Acquisition Guidebook Web Site

The Defense Acquisition Guidebook Web site, <<https://dag.dau.mil>>, has been redesigned to provide the acquisition workforce and DAU's industry partners with a more effective, user-friendly capability to instantly access best business practices, supporting policies, and lessons learned. The revised DAG content includes the guidance needed to implement the acquisition policy changes in DoD Instruction 5000.02 and additional policy implementing the Weapon Systems Acquisition Reform Act of 2009.

New DAG features:

- Redesigned pages that now include more information. The revised presentation improves readability and eases navigation, and users no longer need to view individual paragraphs separately.
- An improved search feature provides more precise search results. It also allows the user to search within the initial results, enabling identification of the most useful information for the task at hand.
- A redesigned Life Cycle Framework view allows the user to quickly determine the information requirements required for each decision event and program type—major defense acquisition programs, major acquisition information systems, and ACAT II and below.
- A Defense Acquisition Portal quick links feature places a wide array of tools at the user's fingertips such as links to additional resources such as the Defense Acquisition Portal (DAP); the Program Manager's Toolkit; the DAU-hosted ACQuipedia; and a Best Practices Clearinghouse site.
- A Defense Acquisition News feature, which provides users with information on the latest acquisition news.
- More timely updates. As new statutes, policies, and direction are introduced, appropriate DAG content changes can be made quickly.

Send any feedback to guidebook@dau.mil.

2010 Business Managers' Conference

This year's Business Manager's Conference will be held May 18 and 19 at the Fort Belvoir Officers' Club. The Business Managers' Conference is a free conference supported by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, and hosted by the director for Acquisition Resources and Analysis, Dr. Nancy J. Spruill. Targeted attendees include the DoD acquisition management workforce as well as members from the DoD financial management, cost estimating, and program analysis and evaluation communities. Defense industry personnel are also welcome to attend. To register or view the conference agenda, go to <<http://bmc.dau.mil>>.

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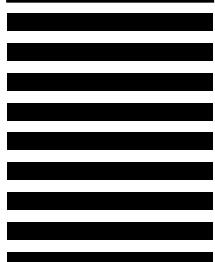
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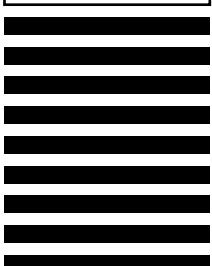
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Acquisition Central

<http://acquisition.gov>

Shared systems and tools to support the federal acquisition community and business partners.

Acquisition Community Connection

<http://acc.dau.mil>

Policies, procedures, tools, references, publications, Web links, and lessons learned for risk management, contracting, system engineering, TOC.

Aging Systems Sustainment and Enabling Technologies

<http://asset.okstate.edu>

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Air Force (Acquisition)

www.safaq.hq.af.mil

Policy; career development and training opportunities; reducing TOC; library; links.

Air Force Institute of Technology

www.afit.edu

Graduate degree programs and certificates in engineering and management; Civilian Institution; Center for Systems Engineering; Centers of Excellence; distance learning.

Air Force Materiel Command

Contracting Laboratory's FARSite

<http://farsite.hill.af.mil>

FAR search tool; *Commerce Business Daily* announcements (CBDNet); *Federal Register*; electronic forms library.

Army Acquisition Support Center

<http://asc.army.mil>

News; policy; *Army AL&T Magazine*; programs; career information; events; training opportunities.

Army Training Requirements and Resources System

<https://www.attrss.army.mil>

Army system of record for managing training requirements.

Assistant Secretary of the Army (Acquisition, Logistics & Technology)

<https://www.alt.army.mil>

ACAT Listing; ASA(ALT) Bulletin; digital documents library; links to other Army acquisition sites.

Association for the Advancement of Cost Engineering International

www.aacei.org

Planning and management of cost and schedules; online technical library; bookstore; technical development; distance learning.

Association of Old Crows

<https://www.myaoe.org>

News; conventions, courses; *Journal of Electronic Defense*.

Association of Procurement Technical Assistance Centers

www.appac-us.org

PTACs nationwide assist businesses with government contracting issues.

Best Practices Clearinghouse

<https://bpch.dau.mil>

The authoritative source for acquisition best practices in DoD and industry. Connects communities of practice, centers of excellence, academic and industry sources, and practitioners.

Central Contractor Registry

<http://www.ccr.gov>

Registration for businesses wishing to do business with the federal government under a FAR-based contract.

Committee for Purchase from People Who are Blind or Severely Disabled

www.abilityone.gov

Information and guidance to federal customers on the requirements of the Javits-Wagner-O'Day (JWOD) Act.

Defense Acquisition Portal

<https://dap.dau.mil>

One-stop source for acquisition information and tools.

Defense Acquisition University and Defense Systems Management College

www.dau.mil

DAU iCatalog; DAU/DSMC course schedules; educational resources; and *Defense AT&L* magazine and *Defense Acquisition Review Journal*.

DAU Alumni Association

www.dauaa.org

Acquisition tools and resources; links; career opportunities; member forums.

Defense Advanced Research Projects Agency

www.darpa.mil

News releases; current solicitations; *Doing Business with DARPA*.

Defense Information Systems Agency

www.disa.mil

Defense Information System Network; Defense Message System; Global Command and Control System.

Defense Modeling and Simulation Coordination Office

<http://www.msco.mil>

DoD modeling and simulation master plan; document library; events; services.

Defense Spectrum Organization

<http://www.disa.mil/dso/>

Operational spectrum management support to the Joint Staff and COCOMs; conducts R&D into spectrum-efficient technologies.

Defense Technical Information Center

www.dtic.mil

DTIC's scientific and technical information network (STINET) is one of DoD's largest available repositories of scientific, research, and engineering information. Hosts over 100 DoD Web sites.

Department of Commerce, Defense Priorities and Allocations System

www.bis.doc.gov/dpas

DPAS regulation, policies, procedures, and training resources.

Deputy Chief Management Officer

<http://www.defenselink.mil/dcmo/index.html>

Information on the Defense Business Transformation Agency and the DoD Performance Improvement Officer.

Deputy Under Secretary of Defense for Acquisition and Technology

www.acq.osd.mil/at

Acquisition and technology organization, goals, initiatives, and upcoming events.

Director, Defense Procurement and Acquisition Policy

www.acq.osd.mil/dpap

Procurement and acquisition policy news and events; reference library; acquisition education and training policy, guidance.

DoD Defense Standardization Program

www.dsp.dla.mil

DoD standardization; points of contact; FAQs; military specifications and standards; newsletters; training; nongovernment standards; links.

DoD Enterprise Software Initiative

www.esi.mil

Joint project to implement true software enterprise management process within DoD.

DoD Inspector General Publications

<http://www.dodig.mil/PUBS/index.html>

Audit and evaluation reports; IG testimony; planned and ongoing audit projects of interest to the AT&L community.

DoD Office of Technology Transition

www.acq.osd.mil/ott

Information about and links to OTT's programs.

DoD Systems Engineering

<http://www.acq.osd.mil/sse>

Policies, guides and information on SE and related topics, including developmental T&E and acquisition program support.

Earned Value Management

www.acq.osd.mil/pm

Implementation of EVM; latest policy changes; standards; international developments.

Electronic Industries Alliance

www.eia.org

Government relations department; links to issues councils; market research assistance.

FAIR Institute

<http://www.thefairinstitute.org>

Organization that promotes a federal acquisition system that continually innovates, exceeds world class standards of performance, and ensures the prudent use of taxpayer dollars.

Federal Acquisition Institute

www.fai.gov

Virtual campus for learning opportunities; information access and performance support.

Federal Acquisition Jumpstation

<http://prod.nais.nasa.gov/pub/fedproc/home.html>

Procurement and acquisition servers by contracting activity; CBDNet; reference library.

Federal Aviation Administration

<http://fast.faa.gov>

Online policy and guidance for all aspects of the acquisition process.

Federal Business Opportunities

www.fedbizopps.gov

Single government point-of-entry for federal government procurement opportunities over \$25,000.

Federal R&D Project Summaries

<http://www.osti.gov/fedrnd>

Portal to information on federal research projects; search databases at different agencies.

Acquisition & Logistics Excellence

An Internet Listing Tailored to the Professional Acquisition Workforce

Surfing the Net

Fedworld Information

www.fedworld.gov

Central access point for searching, locating, ordering, and acquiring government and business information.

Government Accountability Office

<http://gao.gov>

GAO reports; policy and guidance; FAQs.

General Services Administration

www.gsa.gov

Online shopping for commercial items to support government interests.

Government-Industry Data Exchange Program

<http://www.gidep.org>

Federally funded co-op of government-industry participants, providing electronic forum to exchange technical information essential to life cycle development.

Integrated Dual-Use Commercial Companies

www.idcc.org

Information for technology-rich commercial companies on doing business with the federal government.

International Society of Logistics

www.sole.org

Online desk references that link to logistics problem-solving advice; Certified Professional Logistician certification.

International Test & Evaluation Association

www.itea.org

Professional association to further development and application of T&E policy and techniques to assess effectiveness, reliability, and safety of new and existing systems and products.

Joint Capability Technology Demonstrations

www.acq.osd.mil/jctd

JCTD's accomplishments, articles, speeches, guidelines, and POCS.

Joint Interoperability Test Command

<http://jitc.fhu.disa.mil>

Policies and procedures for interoperability certification; lessons learned; support.

Library of Congress

www.loc.gov

Research services; Copyright Office; FAQs.

MANPRINT (Manpower and Personnel Integration)

www.manprint.army.mil

Points of contact for program managers; relevant regulations; policy letters from the Army Acquisition Executive; briefings on the MANPRINT program.

NASA's Commercial Technology Office

<http://technology.grc.nasa.gov>

Promotes competitiveness of U.S. industry through commercial use of NASA technologies and expertise.

National Contract Management Association

www.ncmahq.org

Educational products catalog; publications; career center.

National Defense Industrial Association

www.ndia.org

Association news; events; government policy; *National Defense* magazine.

National Geospatial-Intelligence Agency

www.nga.mil

Imagery; maps and geodata; Freedom of Information Act resources; publications.

National Institute of Standards and Technology

<http://www.nist.gov>

Information about NIST technology, measurements, and standards programs, products, and services.

National Technical Information Service

www.ntis.gov

Online service for purchasing technical reports, computer products, videotapes, audiocassettes.

Naval Air Systems Command

www.navair.navy.mil

Provides advanced warfare technology through the efforts of a seamless, integrated, worldwide network of aviation technology experts.

Naval Research Laboratory

<http://www.nrl.navy.mil>

Navy and Marine Corps corporate research laboratory. Conducts scientific research, technology, and advanced development.

Naval Sea Systems Command

www.navsea.navy.mil

TOC; documentation and policy; reduction plan; implementation timeline; TOC reporting templates; FAQs.

Navy Research, Development, and Acquisition

<http://acquisition.navy.mil/rda>

Policy documents; career management; Acquisition One Source page, providing links to acquisition communities of practice.

Office of Naval Research

<http://www.onr.navy.mil>

News and announcements; publications and regulations; technical reports; doing business with the Navy.

Open Systems Joint Task Force

www.acq.osd.mil/osjtf

Open systems education and training opportunities; studies and assessments; projects, initiatives and plans; library.

Parts Standardization and Management Committee

www.dscc.dla.mil/programs/psmc

Collaborative effort between government and industry for parts management and standardization through commonality of parts and processes.

Performance-Based Logistics Toolkit

<https://acc.dau.mil/pbltoolkit>

Web-based 12-step process model for development, implementation, and management of PBL strategies.

Project Management Institute

<http://www.pmi.org>

Program management publications; information resources; professional practices; career certification.

Small Business Administration

www.sba.gov

Communications network for small businesses.

DoD Office of Small Business Programs

www.acq.osd.mil/osbp

Program and process information; current solicitations; Help Desk information.

Reliability Information Analysis Center

<http://theRIAC.org>

DoD-funded DTIC information analysis center; offers reliability, maintainability, quality, supportability, and interoperability support throughout the system life cycle.

Software Engineering Institute

www.sei.cmu.edu

Advances software engineering principles and practices as well as computer security, and process improvements.

Software Program Managers Network

www.spmn.com

Supports project managers, software practitioners, and government contractors. Contains publications on highly effective software development best practices.

Space and Naval Warfare Systems Command

<https://e-commerce.sscno.nmci.navy.mil>

SPAWAR business opportunities; acquisition news; solicitations; small business information.

System of Systems Engineering Center of Excellence

www.sosece.org

Advances the development, evolution, practice, and application of the system of systems engineering discipline across individual and enterprise-wide systems.

Under Secretary of Defense for Acquisition, Technology and Logistics

www.acq.osd.mil

USD(AT&L) documents; streaming videos; links.

U.S. Coast Guard

www.uscg.mil

News and current events; services; points of contact; FAQs.

U.S. Department of Transportation Maritime Administration

www.marad.dot.gov

Information and guidance on the requirements for shipping cargo on U.S. flag vessels.

Links current at press time. To add a non-commercial defense acquisition/acquisition and logistics-related Web site to this list, or to update your current listing, please e-mail your request to datl(at)dau.mil. Your description may be edited and/or shortened. DAU encourages the reciprocal linking of its home page to other interested agencies. Contact: webmaster(at)dau.mil.

Defense AT&L Writer's Guidelines in Brief

Purpose

Defense AT&L is a bi-monthly magazine published by DAU Press, Defense Acquisition University, for senior military personnel, civilians, defense contractors, and defense industry professionals in program management and the acquisition, technology, and logistics workforce. The magazine provides information on policies, trends, events, and current thinking regarding program management and the acquisition, technology, and logistics workforce.

Submission Procedures

Submit articles by e-mail to [dctl\(at\)dau.mil](mailto:dctl(at)dau.mil) or on disk to: DAU Press, ATTN: Carol Scheina, 9820 Belvoir Rd., Suite 3, Fort Belvoir VA 22060-5565. Submissions must include the author's name, mailing address, office phone number, e-mail address, and fax number.

Receipt of your submission will be acknowledged in five working days. You will be notified of our publication decision in two to three weeks.

Deadlines

| Issue | Author Deadline |
|-------------------|-----------------|
| January-February | 1 October |
| March-April | 1 December |
| May-June | 1 February |
| July-August | 1 April |
| September-October | 1 June |
| November-December | 1 August |

If the magazine fills before the author deadline, submissions are considered for the following issue.

Audience

Defense AT&L readers are mainly acquisition professionals serving in career positions covered by the Defense Acquisition Workforce Improvement Act (DAWIA) or industry equivalent.

Style

Defense AT&L prints feature stories focusing on real people and events. The magazine also seeks articles that reflect your experiences and observations rather than pages of researched information.

The magazine does not print academic papers; fact sheets; technical papers; white papers; or articles with footnotes, endnotes, or references. Manuscripts meeting any of those criteria are more suited to DAU's journal, *Acquisition Review Journal (ARJ)*.

Defense AT&L does not reprint from other publications. Please do not submit manuscripts that have appeared in print elsewhere. Defense AT&L does not publish endorsements of products for sale.

Length

Articles should be 1,500 – 2,500 words.

Format

Submissions should be sent via e-mail as a Microsoft® Word attachment.

Graphics

Do not embed photographs or charts in the manuscript. Digital files of photos or graphics should be sent as e-mail attachments or mailed on CDs (see address above). Each figure or chart must be saved as a separate file in the original software format in which it was created.

TIF or JPEG files must have a resolution of 300 pixels per inch; enhanced resolutions are not acceptable; images downloaded from the Web are not of adequate quality for reproduction. Detailed tables and charts are not accepted for publication because they will be illegible when reduced to fit at most one-third of a magazine page.

Non-Department of Defense photos and graphics are printed only with written permission from the source. It is the author's responsibility to obtain and submit permission with the article.

Author Information

Contact and biographical information will be included with each article selected for publication in *Defense AT&L*. Please include the following information with your submission: name, position title, department, institution, address, phone number, and e-mail address. Also, please supply a short biographical statement, not to exceed 25 words, in a separate file. We do not print author bio photographs.

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